

# Essential Community Medicine

(including relevant social services)

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*Health and Social Service Journal*

# **Essential Community Medicine**

(including relevant social services)

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**MTP PRESS LIMITED**  
a member of the KLUWER ACADEMIC PUBLISHERS GROUP  
LANCASTER / BOSTON / THE HAGUE / DORDRECHT



Published in the UK and Europe by  
MTP Press Limited  
Falcon House  
Lancaster, England

*British Library Cataloguing in Publication Data*

Donaldson, R. J.  
Essential community medicine.—(Essential series)  
1. Public health 2. Medical care  
I. Title II. Donaldson, L. J.  
362.1'0425 RA425  
ISBN-13: 978-94-011-6251-7 e-ISBN-13: 978-94-011-6249-4  
DOI: 10.1007/978-94-011-6249-4

Published in the USA by  
MTP Press  
A division of Kluwer Academic Publishers  
101 Philip Drive  
Norwell, MA 02061, USA

*Library of Congress Cataloging in Publication Data*

Donaldson, R. J. (Raymond Joseph)  
Essential community medicine.  
Bibliography: p.  
Includes index.  
1. Public health—Great Britain. 2. Medicine, preventive—Great Britain.  
3. Community health services—Great Britain. I. Donaldson, L. J. II. Title.  
(DNLN: 1. Community medicine. W 84.5 D676E)  
RA485.D66 1982 362.1'0941 83-708

First published 1983  
Reprinted with minor changes 1983  
Reprinted 1984  
Reprinted with updated material 1985  
Reprinted with further updating 1987  
Reprinted and updated 1988

Copyright © 1983 R. J. Donaldson and L. J. Donaldson  
Softcover reprint of the hardcover 1st edition 1983

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Phototypesetting by Georgia Origination, Liverpool

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## Acknowledgements

One of the benefits of a long professional career is that I have made a wide range of contacts in different disciplines. It is a great pleasure for me to name those who have freely contributed their specialist knowledge in reading various parts of the text: Ian Alexander, John Ashley, John Ashton, Bill Bate, Michael Bishop, Sidney Chave, Philip Clements, John Collins, Cliff Darley, Patrick Hamilton, Deirdre Hine, Jill Moore, Anne Parker, Peter Pharoah, Roy Pilsworth, Derek Prinsley, Emer Shelley, Bernard Streeter, Hugh Thomas and Linda Tuckey. They are in no way responsible for any errors or misinterpretation.

Additionally, I would like to thank the many students in medicine and nursing whose pertinent comments at different stages greatly helped in the development of this book. I was particularly fortunate in having a cooperative publisher and would especially like to thank Phi Johnstone who exhibited infinite patience throughout the various stages of the production of the book.

R.J.D

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## Preface

This basic textbook of Community Medicine, which includes descriptions of the related social services, is intended for a wide range of readers who require knowledge and understanding of the essential aspects of the subject. These include undergraduate medical students and qualified doctors who are engaged in postgraduate courses of study or training schemes, particularly those in community medicine and general practice. When writing this book we also had in mind the needs of students of nursing at all levels at a time when an increasing emphasis on the community is being reflected in the content of curricula and the composition of examination papers.

It is our view that this account of community medicine will also be of value to established practitioners – community physicians, community health doctors, senior nurses and health visitors – who wish to consolidate or update their knowledge. The growing involvement of the professions in the management and planning of health services means that many general practitioners, hospital doctors and nurses are being called upon to take a population perspective and to become acquainted with many of the concepts and issues discussed in this book.

In addition, there are those professionals who work closely with medicine and nursing and have a common concern in providing care and promoting prevention – groups such as social workers and health education personnel. For all these reasons we would hope that many groups might read the book and find it useful.

In presenting the material we have drawn on our own practical and teaching experience, as well as the very extensive literature. In so doing we are ever conscious of the debt we owe to our colleagues, both past and present, in shaping and modifying our approach to the subject.

In the first chapter, we have introduced the main steps to be taken in ‘diagnosing’ the health problems of a population. This is often a field of study, involving as it does a wide range of health data, which students find daunting. In attempting to demystify it we have put special emphasis on providing simple descriptions and definitions of the concepts involved and explaining the origins of the common types

of routinely available data, as well as giving examples of their uses. An outline of basic statistical methods is also included.

Chapter 2 describes the ways in which the nature and frequency of health problems can vary within different groups of the population, from one time period to another or in different geographical locations. Examining the pattern of disease in populations in this way can provide the starting point for studies investigating the causes of disease or encourage service initiatives. At the end of the chapter a systematic description is given of the main features of several common causes of death in industrialized countries: lung cancer, breast cancer, stomach cancer, ischaemic heart disease, cerebrovascular disease and accidents.

In Chapter 3, we deal with the concept of 'cause' before moving on to introduce the reader to one of the most important and exhilarating aspects of community medicine: prevention. Few would deny the importance of preventive medicine, but it has seldom enjoyed the financial support commensurate with the apparent esteem in which it is held. The main strategies in prevention are introduced and fully described in this chapter: health education, immunization and screening and change in legislation and social policy.

In these first three chapters many of the scientific foundations of community medicine are laid down. Throughout, the reader is made aware of the strengths and limitations of the data, the traps that lie in wait for those drawing hasty or superficial conclusions from them and the practical difficulties involved in pursuing preventive goals.

The modern welfare state is a large and complex structure with diverse origins and traditions. During the last decade social services departments have been created and the National Health Service itself has undergone two major reorganizations in 1974 and 1982. Chapter 4 brings together in one place a description of the present structure, organizational framework and method of functioning of this wide range of services. Health and social services are delivered within a complex legal framework and a very brief account is given of the relevant legislation. In undertaking such a description it is necessary to strike a balance between over-complexity and undue simplicity. Hence, to preserve clarity only the broad issues have been dealt with and are in general terms correct, though it must be accepted that there are inevitably exceptions to some of the statements made.

The measurement and description of health problems, aspects of cause and prevention, service provision and legislation are dealt with in Chapters 5 (Handicapped People), 6 (Mothers and Children), 7 (The Mentally Disordered) and 8 (The Elderly). In describing the services provided for these important groups of the population, we have tried to avoid merely cataloguing them, but have commented, where relevant, on their availability and highlighted innovations and

deficiencies. Changes as a result of recent legislation such as the Child Care Act 1980, Education Act 1981 and in the law in relation to mental disorder have been taken into account.

Control of communicable diseases can be achieved only by adherence to a set of rules and these are outlined in Chapter 9. The main features of some important infectious conditions occurring in Great Britain are given, including those about which there has recently been some concern, such as the haemorrhagic fevers and hepatitis.

As well as the more traditional aspects of environmental health, we discuss in Chapter 10 the impact of environmental noise, air pollution and radiation in the light of the latest knowledge. The validity of the historical association between housing and health is also re-examined.

Some of the illustrations are reproduced from teaching material and we thank Angela Chorley and Julia Polonski who originally drew them. Government material is reproduced with the permission of the Controller of Her Majesty's Stationery Office.

We would like to record our thanks to Geraldine McNeill for her expert help with the final manuscript and to Lesley Williams for secretarial support at various stages. The generous and cheerful way in which Peter Waters provided his administrative skills was greatly appreciated. We owe a great debt to David Hall for his assistance, not only on statistical matters but also on more general aspects of the subject. We are particularly grateful to Jeannette Coyle for the speedy and accurate way in which she prepared the many drafts.

*January 1987:* For this reprinting, the opportunity has been taken to update the text with the inclusion of the changes in NHS management following the Griffiths Report, new information on AIDS, a change in Social Security information and updating of the position in relation to child abuse as well as other minor amendments.

R. J. Donaldson  
L. J. Donaldson

## Health data and their sources

### INTRODUCTION

The hospital doctor, the general practitioner, the ward nurse, the district nurse and the health visitor spend most of their working lives making contacts with a succession of individual patients and their families. Impressions about individual illnesses – how common they are, what course they follow, how successful treatment is – are largely formed on the basis of this experience. Such a perspective is inevitably too restricted to be used to draw general conclusions about the health of whole populations. Before undertaking to provide new services or making adjustments to existing services, those concerned with the health of a population must have an accurate picture of the range and extent of health problems within it. The desirability of such an overview may seem self-evident, but it has very seldom been accomplished, even on a small scale. It is often easier and more rewarding to bring high technology medicine to the aid of the sick individual than to identify and grapple with the range and complexity of generalized health problems thrown up by modern society.

The first step in this process is the realization that a population of even a few thousand is not necessarily an homogeneous entity. On the basis of their personal characteristics (the elderly, the single parent family), their work (the foundry worker, the company director), their place of residence (the inner city poor) or their life-style (the cigarette smoker, the motorcycle rider) people can be divided into groups with an identifiable range of health problems. There is no single source which provides this information; sources are many and varied but in general have not been designed to supply information on the health of a population, hence they have limitations when called upon to do so. Yet by piecing together information from different sources, of different types and to which differing levels of importance are attached, it is possible to develop a composite picture of the health of a population, and hence make a 'population diagnosis'. In some ways, the process is analogous to that carried out by a doctor forming a clinical impression

of a patient. By assembling information from history-taking, physical examination, radiological investigation, haematological and biochemical tests, according different importance to each, he formulates the clinical problem and begins to solve it.

One of the key processes in monitoring the health of a community is to look at information which is collected, analysed and presented on a routine basis. Information from specially conducted surveys is another valuable source.

This chapter will firstly give a general description of the measurement of disease, introducing some common concepts such as rates, standardization, incidence and prevalence. It will then describe the main ways of obtaining information which can contribute to the assessment of a community's health. The three main types of routinely collected information are:

- Population data
- Mortality data
- Morbidity data

They are described in detail with special emphasis on the source, uses and limitations of each type. All three, to a varying degree, are subject to quantitative and qualitative deficiencies which limit the conclusions that can be drawn from them. These drawbacks are best appreciated by being familiar with the way in which the data are gathered and therefore this is also described.

## MEASURING DISEASE

### The rate

The basic unit of measurement used in studying disease in populations is the rate. The rate consists of three components: a *numerator*, which is the number of people in the population who experience the events of interest (e.g. deaths, cases of disease, births, admissions to hospital); a *denominator*, which is the total number of people in the population being considered (the population at risk) and a specified *time* period during which the events took place.

The use of a rate allows comparison between different populations, different subgroups within the same population or populations at different times. A statement of absolute numbers, such as: '2000 cases of hypertension were diagnosed last year in District A compared with 700 in District B', may help to plan workload (number of outpatient sessions, number of beds or staffing levels) but does not tell us whether hypertension is a greater health problem amongst the inhabitants of District A compared to District B, since the relative sizes of the two populations are not given.

### *Crude rates*

The word 'crude' implies that the rate concerns the entire population of the geographical area being considered. One such rate commonly used is the crude death rate; the annual crude death rate is expressed as:

Number of deaths (numerator) in the year (time period) divided by the number of people in the total population (denominator)

If this value is multiplied by 1000 the final result is then a 'rate per 1000'.

The crude death rate for males in England and Wales in the year 1979 was 12.4 per 1000 population. The corresponding rate for females was 11.7 per 1000 population. The 'crude' rate gives some information about the mortality experience of a population but it is not sufficiently precise to be of great value when making comparisons with other populations. Nevertheless, it is still quite widely used because the information needed to calculate it (total number of deaths and mid-year population estimate for a given geographical area) is usually readily available. However, two populations being compared may differ in important ways which themselves affect mortality. Comparison of the crude death rates in two areas may raise interest if the rate in one area is much higher than that in the other. Interest would wane, however, if it was discovered that the population with the higher crude death rate had a much higher proportion of elderly residents than its counterpart. More old than young people die and therefore a population containing more elderly people would have a higher crude death rate by virtue of this characteristic alone.

### *Specific rates*

The need to look beyond crude rates leads to the use of specific rates. A specific rate refers to the number of events (in this case deaths) occurring in a subgroup of the population. Age and sex together with cause are the most commonly described subgroups; occupation, social class, and race are others. Thus the annual age-specific death rate for 15-24-year-old males would be expressed as:

Number of deaths in the year of men aged 15-24 years divided by the number of men of that age in the population. If this value is multiplied by 1000, it gives the rate per 1000.

For England and Wales in the year 1979 the mortality rate for 15-24-year-old males was 0.9 per 1000 population of that age. In practice, age-specific rates are nearly always also sex-specific (as shown here) since important differences exist between males and females in their risk of dying from or developing certain diseases.

Death rates may be expressed for individual causes of death rather

than the all cause rates that have been described thus far.

Most diseases show an effect of some kind with age, so that crude death rates are inadequate to describe conditions which are heavily loaded at the extremes of life. The study of age/sex and other specific rates is by far the best way of examining how mortality or other measures vary between different populations. However, by moving away from the crude death rate in order to observe such detailed measures, an attractive feature of the crude rate is lost: its ability to convey an impression in a single figure.

### *Standardized rates*

A more useful summary measure in these circumstances, one which takes account of the different age structures of two populations so that their mortality experience can be compared directly, is provided by standardization. In age standardization, a single standardized death rate is calculated in which allowance has been made for the age (and usually also sex) structure of the population in question.

There are two methods of standardization: indirect and direct. Both begin by choosing a standard population (for example, the population of England and Wales in 1971).

*Indirect standardization.* For the indirect method, an individual age-specific death rate of the standard population is first taken (say, again, that for 15–24-year-olds). This rate is then applied to the numbers of people in the 15–24-years age group in the population being studied to find out how many people of that age would have died in the study population, if the standard population's death rates had prevailed. Numbers of deaths are obtained for each age group in the study population in turn, by repeating the manoeuvre of applying the standard population's age-specific mortality rates to them. After the calculation has been performed for all age groups, the resulting total number of deaths is added up. These deaths did not actually occur in the study population, but are those which would have occurred if the study population had experienced the same mortality as the standard population, and hence they are referred to as '*expected*' deaths. The total number of deaths which actually did occur in the study population is usually available and is referred to as the '*observed*' deaths. These two figures are then incorporated into a measure called the Standardized Mortality Ratio (SMR). This is the ratio of the number of observed deaths to the number of expected deaths and is usually expressed as a percentage. Most people find the concept of the SMR easy to understand: values over 100% represent unfavourable mortality experience, values below 100% relatively favourable mortality experience, the effects of age and sex having been taken into account.



For example, the SMR in 1970–1972 for Social Class I (professional) men between 16 and 64 years was 77, which meant that their mortality was 23% less than that experienced by *all* males of that age. On the other hand the SMR of Social Class V (unskilled occupations) was 137, indicating that their mortality was 37% higher. A simple worked example of the calculation of standardized mortality ratios using social class data is given in Table 1.1.

The purpose of the ratio is to summarize the mortality experienced

**Table 1.1** Worked example of the calculation of a standardized mortality ratio

The aim is to compare the mortality experience of men (aged 15–64 years) in Social Class I (the study population) with that of all men of the same age group in England and Wales (the standard population).

*Population of men in Social Class I (study population)*

15–24 years	95 000
25–34 years	215 000
35–44 years	171 000
45–54 years	137 000
55–64 years	100 000

*Age-specific death rates for all men in England and Wales\* (standard population)*

15–24 years	2.8 per thousand
25–34 years	3.0 per thousand
35–44 years	6.9 per thousand
45–54 years	21.6 per thousand
55–64 years	61.7 per thousand

*'Expected' number of deaths of Social Class I males if their experience was the same as all men in England and Wales*

15–24 years	$95 \times 2.8 =$	266
25–34 years	$215 \times 3.0 =$	645
35–44 years	$171 \times 6.9 =$	1180
45–54 years	$137 \times 21.6 =$	2959
55–64 years	$100 \times 61.7 =$	<u>6170</u>

Total expected deaths = 11 220

*'Observed' (actual) deaths of Social Class I males\* = 8586*

SMR (as a percentage)

$$= \frac{\text{observed deaths}}{\text{expected deaths}} \times 100 = \frac{8586}{11\,220} \times 100 = 77$$

\*3-year mortality rate and observed deaths over a 3-year period (1970–1972) around the time of the 1971 census have been used

by a certain subgroup of the population (this may be a part of a country or city, or an occupational group such as miners or doctors) and at the same time to compare its mortality with that experienced by the population as a whole or other group within it. Although most commonly used to take account of age and sex, standardization can also be used to control for other characteristics: perinatal mortality rates may be standardized for birth weight. The essence of standardization is that it holds or eliminates the effect of the characteristic being standardized for (age, sex, etc.) so that the effect of other factors can be examined. It should be obvious but it is worth emphasizing that once a factor has been used in standardization, then that factor cannot be used to explain a difference between standardization indices. For example, the differences in SMRs in various parts of Britain as shown in Figure 2.7 in Chapter 2, cannot be explained by the fact that different parts of the country have a different age structure, since standardization for age is implicit in this use of the SMR.

*Direct standardization.* Whereas in calculating the indirect method of standardization the death rates occurring in the standard population are applied to the study population, for the direct method the reverse process is used. In the direct method the age-specific death rates of the study population are applied in turn to the numbers in each corresponding age group of the standard population. This gives rise to the number of deaths which would have occurred in the standard population if the death rates in each study population had applied. This number of deaths is divided by the total standard population to give an age-standardized death rate for the population under study.

### *Other rates*

Thus far, some examples of mortality rates have been discussed to illustrate basic principles. Other specific rates such as maternal mortality rate, perinatal mortality rate, infant mortality rate, birth rate and fertility rate are dealt with in Chapter 6.

### **Incidence and prevalence**

Not all diseases are uniformly fatal. The need to take account of diseases such as arthritis and mental illness, from which few people die yet which cause serious problems in the population, has led to alternative measures of illness in the population being introduced. Clearly these health problems would not be adequately described by studying mortality data alone. There are two types of measure of illness or morbidity – incidence and prevalence, and it is most important to be able to distinguish between them.

A summary of the definitions of these common measures of morbidity is given:

- *Incidence*: The number of new cases of a disease occurring per unit of population per unit time.
- *Point prevalence*: The number of persons with a disease in a defined population at a point in time.
- *Period prevalence*: The number of persons with a disease in a defined population over a period of time.

The incidence rate measures the number of *new* cases of a particular disease arising in a population at risk in a certain time period. In contrast, prevalence measures *all* cases of the disease existing at a point in time (point prevalence) or over a period in time (period prevalence). Although one often speaks of prevalence rate of a particular disease, it is not strictly speaking correct to refer to prevalence as a rate. More correctly it is a ratio, since it is a static measure and does not incorporate the idea of cases arising through time. The measure of point prevalence is often compared to a snapshot of the population: it states the position at a single point in time. In measuring a particular disease, prevalence, then, counts individuals within the whole spectrum of that disease from people who have newly developed the disease to those in its terminal phases; not just new cases as does incidence. Thus, prevalence results from two factors: the size of the previous incidence (occurrence of new cases of the disease) and the duration of the condition from its onset to its conclusion (either as recovery or death).

In many chronic diseases complete 'recovery' does not occur: a person may develop the disease (e.g. chronic bronchitis, peripheral vascular disease, stroke) in middle age and may carry it until his death. The incidence of a condition is an estimate of the risk of developing the disease and hence is of value mainly to those concerned with searching for the causes or determinants of the disease. Knowledge of the prevalence of a condition is of particular value in planning health services or workload, since it indicates the amount of illness requiring care. Relatively uncommon conditions (i.e. those with a low incidence) may become important health problems if people with the disease are kept alive for a long period of time (producing a relatively high prevalence figure). An example of such a condition is chronic renal failure which is rare, yet because dialysis and transplantation can keep sufferers alive, it becomes an important health problem which consumes considerable resources. The difference between incidence and prevalence for this condition is illustrated by considering the treatment rates per million population.

In the UK in 1976 15.1 new patients per million population were

treated, whereas the number of people who were under treatment with dialysis or with a functioning transplant at 31 December 1976 was 71.2 per million.

## **POPULATION DATA**

### **The census**

Periodic counting of the population of a country was a feature of the Roman Empire. Christ was born during a census in Judaea. A census has been carried out every ten years in Great Britain since 1801, except in 1941 during the Second World War. The last census was undertaken in April 1981 and the next is due to take place in 1991. For the first time in 1981 other members of the European Economic Community also held their censuses at about the same time as the UK. The census is the most important source of information on the size and composition of the population. It is coordinated by the Office of Population Censuses and Surveys (OPCS).

On the night of the census, all persons alive in the UK are required by law to be enumerated in the household or other establishment where they spent that night. The key to the collection of this massive amount of information is the division of the country into about 115 000 enumeration districts, each consisting of some 200 households. To each enumeration district is allocated an enumerator who is trained to identify households and to deliver, collect and, if necessary, assist in the completion of the form.

A household, for census purposes, is defined as one person living alone or a group of people (who may or may not be related) living at the same address with common housekeeping, temporary residents being included. The form is delivered prior to census day and collected as soon as possible after it. The head of household is required by law to list the names of people in the household and in each case to state sex, date of birth, marital status, usual address, relationship to head (e.g. wife, daughter), country of birth, address one year previously, whether working and details of occupation and employment status, higher education, and usual means of transport to work. Similar information is required for members of the household absent on census night. A separate section of the Schedule relates to the household itself: how many rooms, presence of certain amenities (fixed bath or shower, indoor or outdoor toilet), car availability, and tenure.

Census forms are returned centrally for processing. This detailed information on every inhabitant of Great Britain takes time to process but is an invaluable source of data for a wide variety of agencies such as those concerned with planning houses and schools, pensions and other

social security payments, as well as health and social services. Strict confidentiality is observed so that in any routine tabulations or in special surveys using census data, the data are always aggregated in such a way that no individual can be identified.

### *Undercoverage and accuracy*

The census aims to enumerate 100% of the population. Inevitably it must fall short of this aim, although the extent of undercoverage is not known; particular problems are the tendency to overlook very young children and the homeless. Another difficulty relates to the accuracy of the information obtained: statements on age and marital status are sometimes inaccurate and particular problems arise with respect to occupation, upon which social-class analysis of the population is based. Statements of the occupation may be vague or imprecise or wrong altogether. There is a tendency for people to exaggerate their status in such circumstances.

### *Population estimates and projections*

A major limitation of the census is that it takes place only every ten years. It is desirable, however, to obtain information on the size of the population in the years between censuses (intercensal years). This is undertaken by using the census population as a starting point and taking into account births, deaths and migration. Population estimates are produced by age and sex for the middle of each year between censuses. One of the major sources of error in population estimates is inaccurate data on migration. Information on migration into and out of Britain is available, but knowledge of internal migration is sketchy and inaccuracies can lead to substantial errors in population estimates for smaller areas. Such short-term estimates of the size and structure of the current population between censuses should be clearly distinguished from the population forecasts of a longer-term nature, which are usually referred to as population projections.

Such projections have important practical implications in terms of determining future provision of health services, the size of work forces, building of schools and pension requirements. In common with population estimates, population projections take as their starting point the population group by age and sex as enumerated at the most recent census. The population projection must then make predictions about size and structure of the populations at different times in the future based on assumptions about future levels of mortality, fertility and migration. The figures arrived at may be relatively accurate in the short-term. For example, forecasting the number of elderly people in 20-years' time, taking account of the size of the present middle-aged population and assuming trends in mortality rates, may give a fairly

accurate projection. However, projections which range further into the future come up against the greatest difficulty: that of predicting future levels of fertility. Projections based on interpretation and extrapolation of prevailing trends in fertility into the future have, in the past, often proved grossly inaccurate. So much so that projections are often produced giving alternative predictions based on whether low, intermediate or high levels of fertility are assumed. Population projections are constantly being revised as information on current trends in mortality, fertility and marriage becomes available.

### *Population size and structure*

Data obtained from the census allow population statistics to be derived and produced for a number of geographical areas. The most convenient to consider are those for health service populations: regional and district health authorities, and for various local government authorities. Thus in the health field, they are used to plan the amounts of health facilities and personnel (hospitals, health centres, general practitioners, health visitors, district nurses) required on the basis of previous experience and national guidelines. The composition of the population, e.g. the numbers of elderly or children, provides crude indicators of need for health or social services. In measuring disease, census data are the basis for calculating numbers in the population at risk and hence provides denominators for calculating mortality rates (both crude and specific) and morbidity rates. At a smaller geographical level – ward or parish, or even smaller enumeration districts – much detailed information collected in the census is available as so called ‘small area statistics’. These have great potential in assessing health needs and planning health services for quite small geographical areas.

*Use of small area statistics.* An example of the use of such statistics is illustrated by the work carried out in Teesside County Borough, which was formed in 1968 and disbanded in 1974 with the reorganization of local government. It covered 49 000 acres and had a population of almost 400 000. Lying close to an industrial belt of large chemical and steel complexes on the banks of the estuary of the River Tees was a collection of old urban centres with a high proportion of poor housing. Moving away from the river, pollution lessened and the countryside opened up. The objective of the work was to identify the deprived sections of the population and to bring services to support them.

The assumption was made that they lived in poor housing. From census data three housing characteristics were used for all the separate small enumeration districts in Teesside. These were:

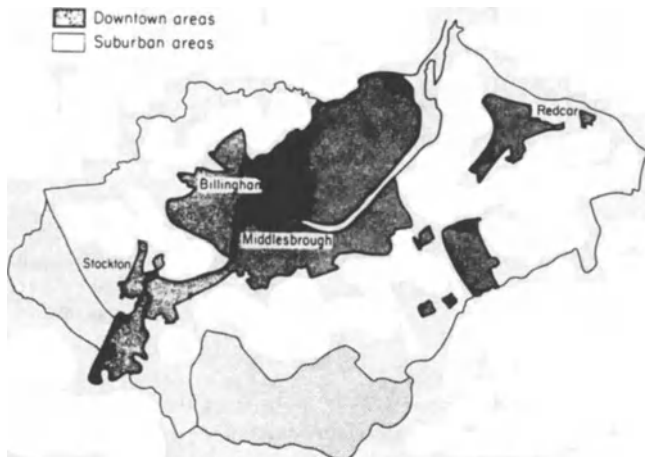
- (a) Proportion of houses lacking one or more basic amenities (w.c., bath, hot and cold water).
- (b) Proportion with more than 1.5 persons per room.
- (c) Proportion privately rented.

Using predetermined criteria, the enumeration districts with poor housing characteristics were categorized as 'downtown'. The downtown population was approximately a fifth of the total. The remainder of Teesside was referred to as 'the rest' (see Table 1.2 and Figure 1.1).

**Table 1.2** Households lacking facilities, expressed as a percentage of total households in each area (Census data for Teesside, 1971)

Area	<i>per cent lacking exclusive use of running hot water</i>	<i>Households</i>	
		<i>per cent lacking exclusive use of fixed bath</i>	<i>per cent lacking exclusive use of inside w.c.</i>
Downtown	23	37	61
Rest	1	2	6

Source: Adapted from Donaldson, R. J. (1976). Urban and suburban differentials. In Carter, C. O. and Peel, J. (eds.) *Equalities and Inequalities in Health*. (London: Academic Press)



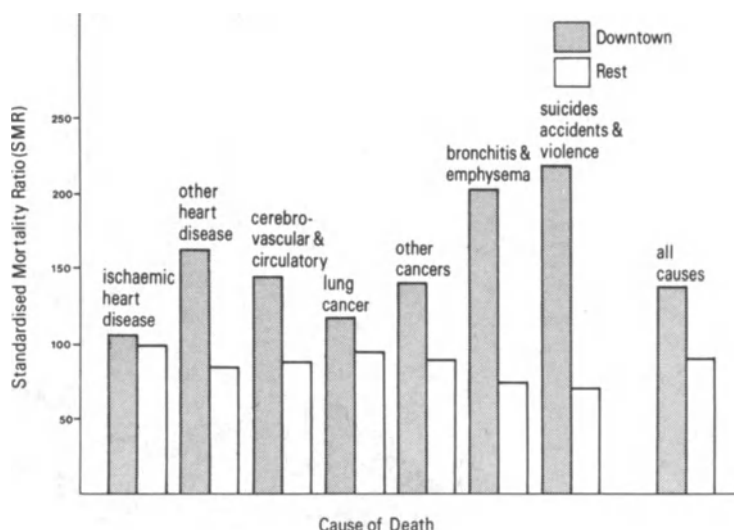
**Figure 1.1** Map of Teesside County Borough. Source: Donaldson, R. J. (1976). Urban and suburban differentials. In Carter, C. O. and Peel, J. (eds.) *Equalities and Inequalities in Health*. (London: Academic Press)

**Table 1.3** Infant mortality rates (per 1000 live births) for Teesside County Borough, 1971

Area	Neonatal* rate	Post-neonatal* rate	Infant* rate
Downtown	19	13	32
The rest	9	8	17
Teesside total	11	9	20

\*These terms are explained in Chapter 6

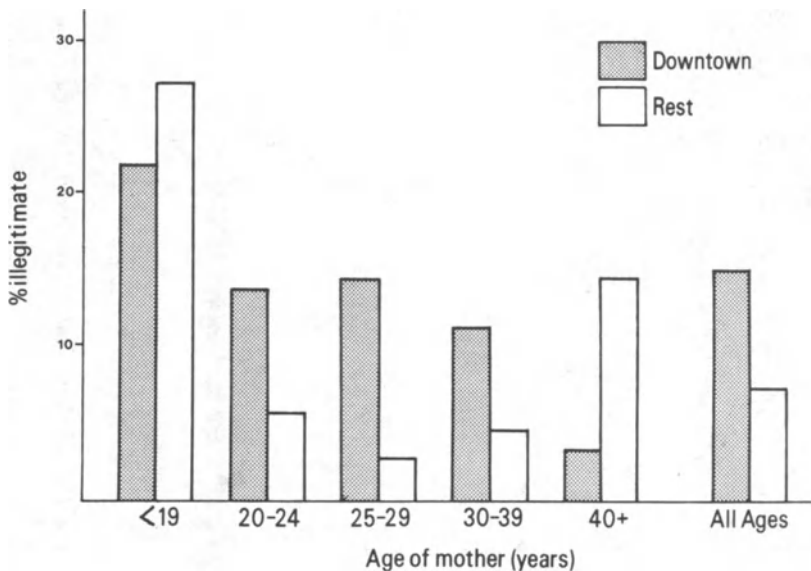
Source: Adapted from Donaldson, R. J. (1976). Urban and suburban differentials. In Carter, C. O. and Peel, J. (eds.) *Equalities and Inequalities in Health*. (London: Academic Press)



**Figure 1.2** Standardized mortality ratios (SMRs) for various causes in 'downtown' areas compared with 'rest' of Teesside County Borough. Source: Adapted from Donaldson, R. J. (1976). Urban and suburban differentials. In Carter, C. O. and Peel, J. (eds.) *Equalities and Inequalities in Health*. (London: Academic Press)

A number of health indices were then compared in order to examine differences between these two types of area. When compared for standardized mortality ratios (SMRs) for various causes of death (Figure 1.2), infant mortality (Table 1.3) or illegitimacy rates (Figure 1.3), the 'downtown' areas persistently fared worse than the rest of Teesside. This study thus identified the multiple deprivation of the inner urban area: poor housing, high unemployment, poor health, and



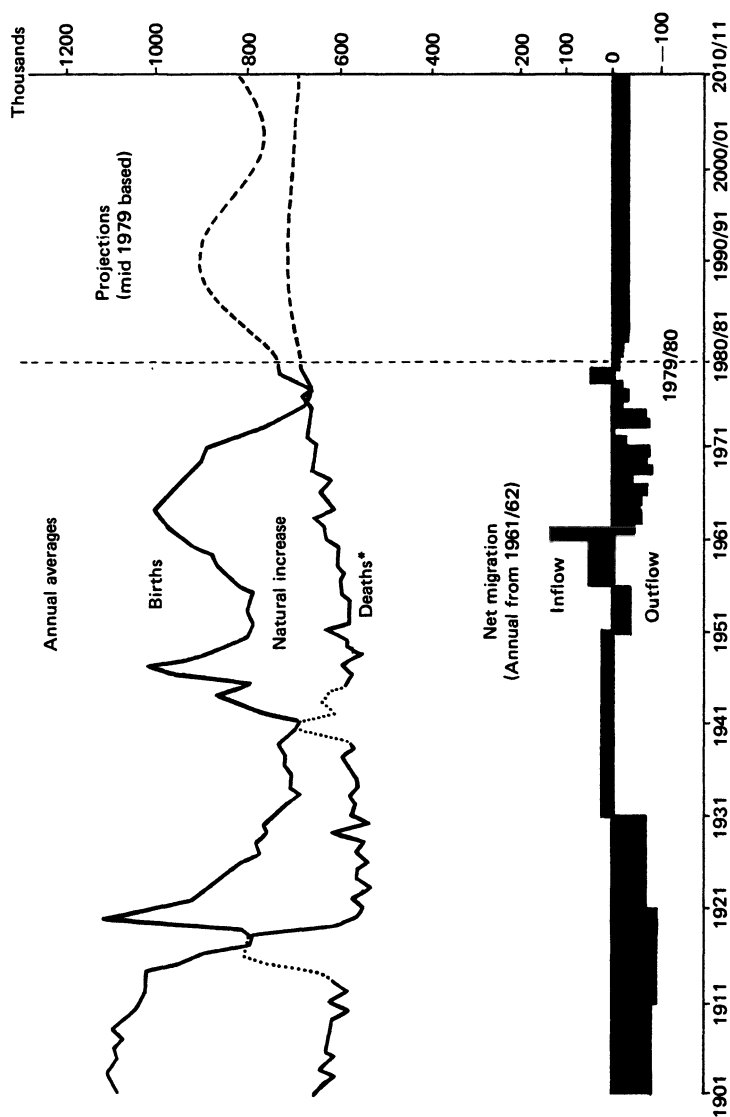


**Figure 1.3** Proportion of births which were illegitimate in 'downtown' areas compared with 'rest' of Teesside County Borough in 1971. Source: Adapted from Donaldson, R. J. (1976). Urban and suburban differentials. In Carter, C. O. and Peel, J. (eds.) *Equalities and Inequalities in Health*. (London: Academic Press)

low uptake of services. Through these findings action was taken to deploy services to meet the problems, although it must be appreciated that such problems rooted in social, economic and cultural factors will not be resolved by action within the health service alone.

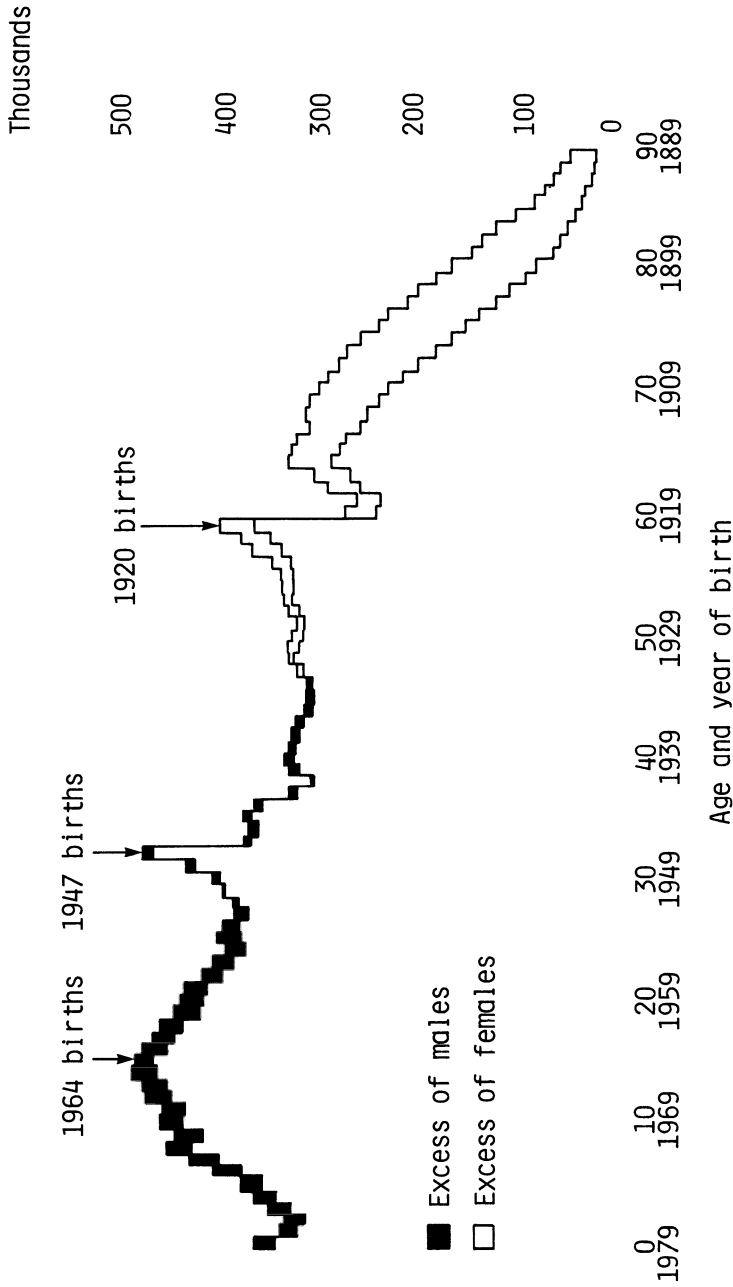
### Components of population growth

Three different factors affect the size of the population: the number of births; the number of deaths and the extent of migration into or out of it. The difference between the number of births and deaths in a particular year is referred to as the 'natural increase' and gives a crude indicator of the net gain or loss to the population because of the addition through births or subtraction through deaths. In the first decade of the present century for each year the number of births far exceeded the number of deaths, and as a result the population of the United Kingdom increased from 38.2 million to 42.1 million (see Figure 1.4). Overall the extent of natural increase of the population of the United Kingdom has fallen steadily, from an average annual natural increase of 467 000 in the period 1901–1911, to 86 000 in the period



**Figure 1.4** Population changes and projections: United Kingdom. Source: Central Statistical Office (1980). *Social Trends*, No. 11, 1981 Ed. (London: HMSO)

\*The dots on this line cover the periods 1914–1918 and 1939–1945 which included death of non-civilians and merchant seamen who died outside the country.



**Figure 1.5** Population of the United Kingdom by age and sex, 1979. Source: Central Statistical Office (1980). *Social Trends*, No. 11, 1981 Ed. (London: HMSO)

1979–1980. Low levels of natural increase were recorded during parts of the First and Second World Wars and during the economic depression of the 1930s. High levels were recorded in the ‘baby booms’ which followed the Second World War and in the period of economic prosperity during the mid-1960s. The lowest levels of natural increase of the century were recorded, however, in the mid 1970s and in the years 1976–1977 births were exceeded by deaths so that there was a net fall of 5000. By the middle of 1979 the population of the United Kingdom stood at an estimated 55.9 million, the first increase since the middle of 1974, caused by a rise in the number of births and fall in the level of net migration outwards.

The impact of changes of fertility levels in the past is not only on the size of the population but also on its structure in terms of the numbers of males and females in each age group. Past mortality and survival rates also, of course, determine the age and sex structure of a population: this is discussed in more detail in Chapter 8. The way in which past bulges in births have worked themselves into various age groups of the present population is well illustrated in Figure 1.5. The excess of males over females in the earlier years is explained by the fact that more boys are born than girls, but as more men than women die every year there is an excess of females from middle-age onwards.

## **MORTALITY DATA**

### **Registration of deaths**

Provision for the registration of births and deaths was made in an Act of Parliament in 1836 and the procedure was made compulsory in 1874. Data derived from records of births, changes in civil status (marriage) and deaths are part of the system of vital statistics which is maintained by most developed countries. The collection of mortality data today thus depends ultimately on the certification and registration of every death which occurs. The system for collecting this information is organized by the Office of Population Censuses and Surveys (OPCS). The information is collected locally in a network of registration and sub-registration districts throughout the country administered by Superintendent Registrars and Registrars who are appointed by the local authority. The key individuals in the registration of a death are: the qualified informant, the registered medical practitioner (who attended the deceased during his last illness) and the local Registrar of births and deaths. The qualified informant is usually a close relative of the deceased, but in other circumstances may be any person present at the death, or the occupier of the institution in which the death took place, or any person who found the body. The qualified

informant, who must attend the local registrar's office in person within five days of the death, provides the registrar with a tear-off portion of the medical certificate given to him by the attending physician and furnishes, orally, details of the date and place of death; name, sex, date and place of birth of the deceased; the deceased person's occupation and place of residence.

### *Cause of death*

A registered medical practitioner attending the person during his last illness is required by law to issue a medical certificate of cause of death. This certificate (see Figure 1.6) is in an internationally agreed format and the doctor must state: the cause of death ('to the best of his knowledge and belief'), whether this statement of cause takes into account post-mortem evidence, the date he last saw the deceased alive, whether he saw the body after death and the length of time between onset of disease and death. This certificate may be sent by post to the local Registrar of Deaths, although for convenience it is often given to the qualified informant to deliver. The cause of death stated by the doctor on this certificate falls into two sections. Part I asks for the immediate cause of death (I (a)) together with any conditions giving rise to it (I (b) and I (c)). Thus a sequence of events is established, for example:

- I (a) Uraemia 36 hours
- (b) Acute retention of urine 3 days
- (c) Benign prostatic hypertrophy 6 years

For some causes of death, no such sequence will be stated, for example:

- I (a) Acute myocardial infarction
- (b) —
- (c) —

Part II asks for other significant conditions contributing to the death but not a major factor in the chain of events leading to it. In the certifying practitioner's opinion there may be no such condition, so that this part of the certificate is left blank. In another case it may be relevant to complete it; one example would be:

- I (a) Bronchopneumonia 5 days
- (b) Chronic bronchitis 15 years
- (c) —
- II Diabetes mellitus 20 years

In certain circumstances, such as when the cause of death is unknown or there are suspicious circumstances or no doctor has seen

BIRTHS AND DEATHS REGISTRATION ACT 1953  
(Form prescribed by the Registration of Births, Deaths and Marriages Regulations 1968)

## MEDICAL CERTIFICATE OF CAUSE OF DEATH

For use only by a Registered Medical Practitioner WHO HAS BEEN IN ATTENDANCE during the deceased's last illness, and to be delivered by him forthwith to the Registrar of Births and Deaths.

**Name of deceased** ..... **Age as stated to me** .....

**Date of death as stated to me** ..... **day of** .....

**Place of death** ..... **day of** .....

**Last seen alive by me** ..... **day of** .....

**1** The certified cause of death takes account of information obtained from post-mortem.

**2** Information from post-mortem may be available later.

**3** Post-mortem not being held.

Please state: **a** when after death by me.  
**b** when after death by another medical practitioner but not by me.  
**c** Not seen after death by a medical practitioner.

### CAUSE OF DEATH

<p><b>I</b></p> <p>Disease or condition directly leading to death †</p> <p><b>Antecedent causes.</b> Morbidity conditions, if any, giving rise to the condition leading to the underlying condition last.</p> <p><b>Other significant conditions.</b> Contributing to the death, but not related to the disease or condition causing it.</p>	<p><b>II</b></p> <p>This does not mean the mode of dying, such as heart failure, pneumonia, asthma, etc. It means the disease, injury, or complication which caused death.</p>
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† This does not mean the mode of dying, such as heart failure, pneumonia, asthma, etc. It means the disease, injury, or complication which caused death.

I hereby certify that I was in medical attendance during the above named deceased's last illness, and that the particulars and cause of death above written are true to the best of my knowledge and belief.

**Signature** ..... **Qualifications as registered by Medical Council** }  
**Residence** ..... **Date** .....

SEE BACK

Registrar to enter  
No. of Death Entry .....

MED A 000000

Figure 1.6 Medical certificate of cause of death – front of form

the deceased in the week prior to his death, the medical practitioner or the Registrar has a duty to report a death to the coroner who may order a post-mortem to be performed and hold an inquest if he deems it necessary.

### *Death returns*

After he has received the death certificate and the details from the qualified informant, the Registrar of Deaths completes the death register, issues a disposal order (which permits burial or other disposal of the body) and enters the particulars of the death on a draft death return (see Figure 1.7). This return is sent to the OPCS in weekly batches for processing. Another copy or an extract is sent to the District Medical Officer of the Health District in which the deceased

Reg Dist	District & SD Nos	Entry No
Sub Dist	Date of registration	
<b>DRAFT OF PARTICULARS OF DEATH TO BE REGISTERED</b>		
1 Date and place of death (date) . . . . .		
2 Name and surname		3 Sex
		4 Maiden surname of woman who has married
5 Date and place of birth (date) . . . . .		
6 Occupation and usual address		
8 Cause of death		
Ia . . . . .		
b . . . . .		
c . . . . .		
II . . . . .		
Certified by		
7 (a) Name and surname of informant		(b) Qualification
(c) Usual address		
<input type="checkbox"/> National Health Service medical card collected? * YES NO If NO, NHS No . . . . .		Signature of registrar

**Figure 1.7** Draft death return – particulars registered at death

resided. Each piece of information on the return is given a numerical code by clerical staff at OPCS and thus transferred to a computer where it is stored and analysed. The coding of most items, such as place of residence, place of birth, age and sex, is a relatively straightforward matter, but coding of the information relating to cause of death is more complex.

*The International Classification of Diseases.* The basis of the process is the selection of the underlying cause of death and assignment to it of a

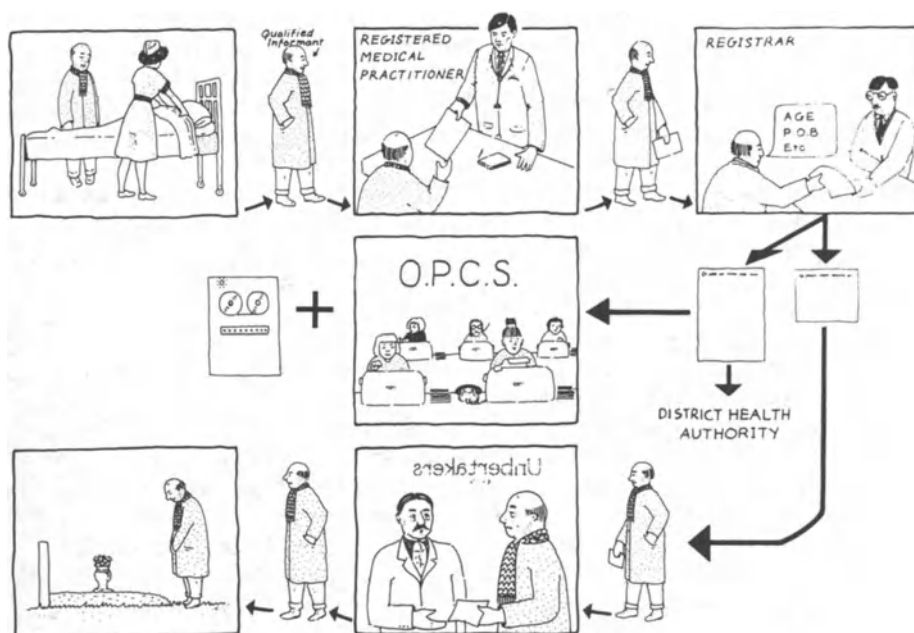
APPENDICITIS (540–543)		
540	<i>Acute appendicitis</i>	
540.0	With generalized peritonitis	
		with:
Appendicitis (acute)	}	perforation
Caecitis (acute)		peritonitis (generalized)
		rupture
Rupture of appendix		
540.1	With peritoneal abscess	
Abscess, appendix		
540.9	Without mention of peritonitis	
Acute:		
	appendicitis	} without mention of perforation, peritonitis or rupture
	caecitis	
541	<i>Appendicitis, unqualified</i>	
542	<i>Other appendicitis</i>	
Chronic appendicitis		Recurrent appendicitis
543	<i>Other diseases of appendix</i>	
Appendicular or appendiceal:		} of appendix
colic	Diverticulum	
concretion	Hyperplasia	
fistula	Intussusception	
	Mucocele	
	Stercolith	

**Figure 1.8** International Classification of Diseases: codes for a common disorder, taken from the chapter on Diseases of the Digestive System. Source: World Health Organization (1977). *Manual of the International Statistical Classification of Disease, Inquiries and Causes of Death (9th Revision)*. (Geneva: World Health Organization)



code number chosen from the International Classification of Diseases. The underlying cause is the morbid condition which started the chain of events which led to the death. Thus, in the first example given above the underlying cause was 'benign prostatic hypertrophy', in the second example it was 'acute myocardial infarction' and in the third example 'chronic bronchitis'. In these examples, the coding clerk chooses the condition listed on the lowest line under Part I. On occasions, however, the medical practitioner certifying the cause of death will enter an illogical sequence or a vague diagnosis on the certificate. Clerical staff are trained to overcome such difficulties by obeying a pre-existing set of rules.

The International Classification of Diseases drawn up by the World Health Organization and used by many countries is now in its 9th revision. The diagnoses are grouped into chapters, starting with those relating to infectious and parasitic diseases and ending with codes relating to injury and poisoning. The codes are based on three-digit



**Figure 1.9** Registration of death

categories running from 001 to 999, each being further divided (where appropriate) into subcategories numbered 0–9. Supplementary codes are also included to cover special features (e.g. the ‘E Code’ to describe external cause of injury). Figure 1.8 shows a short extract from the chapter on diseases of the digestive system to illustrate the range of code numbers available for a common surgical condition. The classification thus provides a glossary which allows for greater precision and uniformity in medical diagnosis, including terms to allow coding of varying medical terminology for essentially the same condition – or to bring together in a stock classification similar conditions.

The stages in the collection of mortality statistics are depicted in Figure 1.9.

### **Reliability of information**

Mortality statistics have an important advantage over other sources of health information: the occurrence of death is dramatic and clear-cut. Therefore it is unlikely to be missed and for over 100 years it has been required by law to be registered.

However, doubts about the reliability of the information gathered at registration were implicit in the previous section, in the description of its mode of collection. Firstly, the status of the qualified informant, who is required to furnish details such as age, occupation, place of birth, gives rise to concern. The patient’s immediate next of kin, if a close relative such as a spouse, might be expected to supply fairly accurate details. As the informant’s relationship to the deceased becomes ever more remote, as it must if no immediate next of kin exists, then the accuracy of the information must surely suffer. There is a tendency, for example, when reporting age for informants to round off to the nearest ‘zero’ or ‘five’ digit.

A more serious type of error relates to the reporting of occupation at registration. Relating mortality statistics to occupation permits detection of workers at special risk from occupational hazards. Moreover, occupation is the basis for the Registrar General’s determination of Social Class, so that mortality rates for different causes of death can be used to highlight differential risk amongst the social classes. A precise classification of occupations exists for the purpose of collecting these data: for example, coal miners who work above ground are assigned to a different category from those working below ground. The concept of social class is discussed more fully in Chapter 2. The qualified informant (who is the ultimate source of this information), even if he or she is a close relative of the deceased, may not be aware of precise details of this sort. There is also a tendency on the part of the informant to misrepresent such details. Thinking warmly of the

deceased, just after death, a man's wife may 'promote' him from shop-floor worker to foreman or choose the most prestigious job held by him during his lifetime, even if it was not his occupation at the time of death.

Information relating to number of deaths (the numerator) comes originally from the qualified informant, possibly under rather emotional circumstances, at death registration. On the other hand, information about the population or subgroups of the population (the denominator) is often self-reported and comes from the head of the household at the time of the census. Thus it is likely that there will be different degrees of accuracy for particular pieces of information (for example, occupation) between these two sources and such differences may lead to bias.

Mortality rates for different causes of death derive ultimately from the statement of death made by the medical practitioner who certified the death. In many cases this is based purely on clinical opinion, since the majority of deaths are not submitted to post-mortem examination. Inaccuracies in the cause of death are more common in old age: death in a young person excites more concern and is likely to be more fully investigated. Deaths in the elderly are often ascribed to terminal conditions such as 'bronchopneumonia' when the certifier is uncertain as to the precise underlying cause. For individual diseases where a firm diagnosis can be made during life, such as in many cancers, certification is usually more accurate. A more general disadvantage of the way cause of death is certified relates to the concept of underlying cause of death. With the growing appreciation of the multiple pathologies which accompany the ageing process, it seems increasingly illogical to cling to the notion of a single underlying morbid process, hence experiments are under way to explore multi-cause coding of death.

### **Uses of mortality data**

Whilst mortality statistics today cannot be relied on to single out all important health problems in a population, they still have important applications. Because of their comprehensiveness and easy availability, they are often a good starting point for describing a health problem, from which a more detailed investigation can carry on. In particular, the examination of patterns of causes of disease between different subgroups of the population, different places, or different time periods can often yield important associations, provided the qualitative limitations of the data are taken into account. These applications are further discussed in Chapter 2.

### *Occupational mortality*

A good example of the way in which mortality data are used is provided

by the decennial supplement on occupational mortality published by the OPCS<sup>1</sup>. Modern men and women spend much of their lives away from home at a place of work. Many working environments such as factories, foundries, mines or chemical plants are not pleasant and it is natural to reflect that they may be involved, to some extent, in the evolution of illness. The study of occupational factors in disease has a long tradition, from the discovery by Pott in 1775 of the association between soot and the development of scrotal cancer in chimney sweeps, to more modern hazards such as the risk of bladder cancer in the rubber industry (see also Chapter 3). Mortality rates for different occupations cannot be produced annually like mortality rates for age and sex groups, and for various parts of the country because although occupation of the deceased is recorded at death registration and so the numerator for an occupation-specific death rate is available annually, the denominator (the number of people in the population actually following each occupation) is known routinely and relatively accurately only at the time of the census (every ten years). It cannot be estimated accurately in the years between censuses in the way that population estimates of the age and sex composition of the population are routinely made. Thus the numbers of deaths in a given occupation at a period around the time of the census are related to the numbers in that population counted at the census.

In addition to the general limitations of mortality data, there are some special problems with mortality data for occupations. There may be difficulties in classifying occupations from the descriptions given. Moreover, bias may be introduced by discrepancies in the information provided at the census and death registration (the issue raised above in the context of the qualified informant). A further source of misinterpretation lies in the tendency for certain occupations to deliberately recruit a healthier workforce and for unhealthy workers to be 'weeded out'; thus a comparison between the risk of a particular occupation and the general population may not start by comparing like individuals.

**Table 1.4 Occupations in which the standardized mortality ratio (SMR) for various causes is very high**

<i>Occupation</i>	<i>Cause of death</i>	<i>SMR</i>
Publicans, innkeepers	Cirrhosis of the liver	1576
Pharmacists	Suicide	464
Coal mine workers (underground)	Pneumoconiosis	2315
Steel erectors; riggers	Accidental falls	1401

Source: Derived from OPCS (1978). *Occupational Mortality. Decennial Supplement, 1970-1972*. (London: HMSO)

Table 1.4 shows a selection of occupations in which the SMR for the stated cause is very high. In studying such associations the question naturally arises as to whether the presumed adverse factors are part of the actual working environment of the person concerned, or whether they are due to his or her life-style apart from occupation. Occupational mortality is, of course, only one of the uses of mortality data and others will be introduced at relevant points in other chapters.

### *Not by mortality data alone*

One hundred years ago, the health of a population was monitored almost exclusively by observing death or mortality rates. At a time when infectious diseases were a most important health problem and were in the majority of cases rapidly fatal or cured, mortality rates from these conditions gave a good impression of the frequency and distribution of a disease in the community. With the great sanitary reforms, improvements in general living standards and, to a lesser extent, improvements in medical care over the past 100 years, the acute infectious diseases no longer dominate the medical scene. The important diseases of the Western World are now the so-called 'chronic' diseases such as heart disease, cancer, stroke, degenerative joint disease and mental illness, many of which run a remitting course over many years and are not, at least immediately, fatal. The traditional use of mortality data is now of limited value in describing the whole of a disease problem. If the disease is rapidly and uniformly fatal then the mortality rate for that condition is a good reflection of the frequency of the disease. If only a proportion of cases of the disease are fatal or the time between onset of disease and death is lengthy, then the mortality rate incompletely describes the problem.

The lessening reliability of mortality data as a 'window on morbidity' has led to the establishment of a wide range of systems to collect information on illness or morbidity in the community. Nevertheless, because of their completeness and easy accessibility, mortality data are often the first stage used in defining a health problem.

## **MORBIDITY DATA**

The most diverse system of health information is that providing data on morbidity – illness in general, whether or not it results in death. Thus morbidity data have the potential to complete the picture which is only hinted at by mortality data. A number of types of morbidity data are collected, analysed and presented on a national basis. The body mainly responsible for this in England and Wales is again the OPCS. Examples of such data are: data on hospital patients; notifications of infectious diseases; the General Household Survey; notifications of

congenital malformations; the general practice morbidity survey; cancer registration; abortion statistics; and statistics of incapacity for work (collected by the Department of Health and Social Security). Other data collected but not analysed and tabulated routinely may be a useful source of information on morbidity, e.g. school medical records, those of the armed forces, or records of industrial accidents and disease. Similarly, systems may be set up through local initiative in individual health authorities. All of these systems have serious limitations, however, in telling us what we usually want to know – the extent and distribution of a particular health problem in the community. However, the fact that such data are available routinely means that they are valuable aids to assessing the health of the community, provided that their limitations are borne in mind.

Four examples of morbidity data sources are discussed:

- (1) Hospital data
- (2) Data from general practice
- (3) The General Household Survey (includes information on morbidity which does not present to medical services)
- (4) Registers, including cancer registration.

#### **(1) Hospital data**

Four main sources of hospital data are available. All these systems have been reviewed by a Steering Group on Health Services Information (the Körner Committee)<sup>2</sup> and it is proposed that they will be subsumed into an integrated system for patient information, possibly to be implemented in the late 1980s.

(a) *Hospital Activity Analysis*. Hospital Activity Analysis (HAA) is a regionally based information system with 100% cover of all but two categories of patients and is designed to aid management and planning. Every National Health Service hospital inpatient in England and Wales who is not occupying a mental illness or maternity bed has the details of that admission recorded. An abstract of the case notes is completed at the time of discharge from, or death in, hospitals. Details recorded include clinical information (consultant, specialty, diagnoses, operative treatments received), personal details (age, sex, marital status, place of residence), and administrative information (date of admission, date of discharge or death, mode and source of admission, place to where discharged) and become part of a computerized record which is held by the Regional Health Authority. Hospital registration number is recorded, but the patient's name is not usually held on the computer file, to preserve confidentiality. HAA was introduced in 1970 and was envisaged as a way of assisting the hospital consultant by

rapidly providing information on the operation of his department and for regional planning. In the authors' experience, it has not yet been used to its full potential. There is still widespread distrust, on the part of clinicians, of the quality of the clinical data.

(b) *Hospital Inpatient Enquiry (HIPE)*. This is a centrally organized statistical system for the analysis of a 10% sample of hospital deaths and discharges generated by HAA. Data derived primarily from HAA are coordinated by OPCS in association with DHSS. The scheme began on a voluntary basis in 1949 and was made obligatory in 1957.

About two years after the data are collected reports are published giving tabulated analyses of the information. The system is clearly not suitable, therefore, for day-to-day management decisions, but allows patterns in different parts of the country to be studied.

(c) *Annual Hospital Returns*. A further source of hospital data is the principal Annual Hospital Statistical Return (SH3 returns) to the DHSS, which is based largely on daily returns made by individual wards. These are collected locally but collated centrally and provide information, by specialty, for: average daily number of available and occupied beds, number of discharges, average length of stay and waiting list.

Data on outpatients are also collected. However, since no clinical information is included in the Annual Hospital Return, its value is limited to administrative purposes.

(d) *Mental Health Enquiry*. Data on psychiatric inpatients are collected via a separate system, the Mental Health Enquiry, which records clinical and administrative details at the time of admission and discharge for each patient, thus allowing for the fact that many patients have relatively long inpatient stays. The information is collated and analysed centrally by the Department of Health and Social Security, who produce routine tabulations. Information may be requested by individual health authorities to aid planning, administration, or research. The system is discussed in greater detail in Chapter 7, which deals with the Mentally Disordered.

### *Limitations of hospital data*

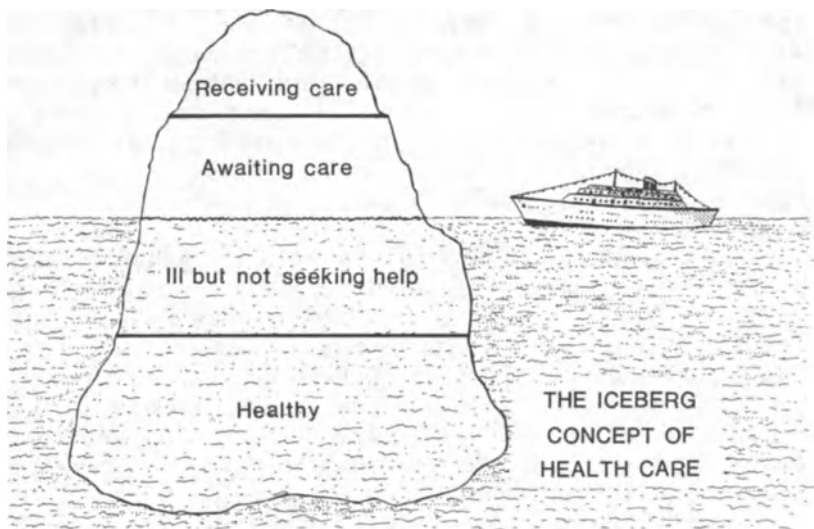
Data on hospital inpatients are collected in most developed countries for the purpose of recovering the cost directly or indirectly from patients, and usually a component of clinical information is also gathered. As a measure of morbidity in the population, however, the hospital data systems which have been discussed have serious drawbacks.

*Accuracy.* Local investigations have shown that inaccuracies occur, particularly with clinical information. There is no legal requirement for the doctor caring for the patient to supply diagnostic information on a hospital discharge form as there is at death certification. In a proportion of hospitals, this information is left blank by the medical staff and has to be inserted by a coding clerk in the medical records department who reads through the case notes to arrive at a 'diagnosis', a task they are obviously unqualified to undertake. Ultimately, the accuracy of these data depends on the willingness and conscientiousness of medical staff to supply the information. Ironically clinicians often berate the quality of the data produced by the systems.

*Limited coverage of diseases.* Hospital discharge data as an indicator of morbidity only take account of those conditions for which inpatient care is required. Diseases for which the patients do not require hospitalization will clearly not be revealed by hospital inpatient statistics. Many 'important' health problems (e.g. common cold, migraine, backache), at least as judged by the proportion of the population affected by them and the economic implications of work-days lost, etc., are unlikely to lead their sufferers to require hospital inpatient care.

*The health services iceberg.* In other relatively serious conditions such as asthma, hernia, arthritis, a proportion of people afflicted will not make the decision to seek health care (even though they may recognize themselves as 'ill'), a further proportion will visit their general practitioners only, whilst others will come to the attention of hospital services as outpatients or inpatients. Only the very last group will be recorded in the HAA or HIPE data. In some disorders where hospitalization is mandatory, such as fractured neck of femur or perforated duodenal ulcer, hospital death and discharge rates may approximate to the incidence of the condition in the population. These conditions are few, so conclusions about incidence of disease based on hospital death-discharge data should be interpreted with great caution. The phenomenon whereby only a proportion of patients make contact with health services and in particular hospital services is often referred to as the 'tip of the iceberg' (see Figure 1.10). The process which leads people into the tip of this iceberg is complex and depends on many factors such as: the patient's perceptions of his ill health; the attitude of himself, his family and friends, and society in general to illness; and the availability of medical services. Thus the observation that the death-discharge rate for cholelithiasis (gallstones) was much higher in District A than District B could mean many things. It might be concluded immediately that the incidence of gallstones was greater in





**Figure 1.10** The iceberg concept of health care

District A than District B and that there might be factors in the diet or environment of District A leading people to be at greater risk of developing the disease; that would be a superficial conclusion. It would be first necessary to consider the possible presence in District A of greater availability of beds, higher throughput (number of patients treated for each available bed) or a clinician with a special interest in the condition. These factors alone might lead to more admissions (and hence a higher death-discharge rate) for gallstones in District A, even if the true incidence of the condition were identical in the two districts.

*Other limitations.* HAA and HIPE record the number of deaths and discharges from hospital but do not attempt to relate to the individual: the system is designed to count events, not people. The numerator for a hospital discharge rate consists of the number of deaths and discharges for a particular condition, not the number of people dying or being discharged with that condition. A figure, for example, of 1000 deaths and discharges during a month in the hospitals of a district may represent 1000 patients who have all had a single admission to hospital or it may represent 250 patients who have been admitted four times each.

The population at risk is the population from which the hospital or hospitals concerned admit patients (catchment population). Catchment populations are usually worked out on a proportional basis from

HAA. Which patients are admitted to hospital and to which hospital depends largely on the general practitioner. Thus changes in practices may make considerable differences to admission policies. It is virtually impossible to define a catchment population geographically as there is considerable overlapping of the areas from which patients come to adjacent hospitals.

### *Uses of hospital data*

Hospital data are used for two main purposes: firstly in the manner already discussed using death-discharge rates as an indicator of morbidity, different populations and different sub-groups of the same population can be examined. The limitations of this method just discussed must be carefully borne in mind and for most conditions the sources of bias inherent in the system preclude any causal inferences being drawn from hospital inpatient data. Secondly, HAA and HIPE data serve as a basis for many administrative decisions, including planning and resource allocation.

Despite the drawbacks of the systems, they are the best currently available. At present they are underused and the only way to eliminate difficulties is by using them more frequently. Provided its limitations are appreciated, HAA, for example, can serve as an important tool in local health service planning and decision-making.

**Table 1.5 Outcome and lengths of stay for acute admissions with fractured neck of femur; data from Hospital Activity Analysis**

<i>Outcome</i>	<i>% of patients</i>		<i>Mean length of stay (days) prior to outcome</i>	
	<i>Males</i>	<i>Females</i>	<i>Males</i>	<i>Females</i>
Death	20	18	32	26
Home	45	24	29	33
Preconvalescent bed	14	29	27	28
Geriatric rehabilitation	} 16	13	} 29	30
Geriatric long-stay		12		52
Unknown	5	4	—	—
Total	( <i>n</i> = 117) 100	( <i>n</i> = 352) 100	30	36

Source: Donaldson, L. J., Stoyale, T. F. and Clarke, M. (1979). Fractured neck of femur in Leicestershire. *Public Health, London*, 93, 285-289

Table 1.6 Bed usage by fractured neck of femur in different types of hospital for a one-year period; data from Hospital Activity Analysis

Type of hospital	Bed-days occupied by fractured neck of femur		Total bed-days occupied in orthopaedic specialty		Total bed-days occupied in geriatric specialty		Percentage of fractured neck of femur	
	Male	Female	Male	Female	Male	Female	Male	Female
Acute								
orthopaedic	2894	10208	16218	23244	—	—	18	44
Preconvalescent	571	2426	1702	5320	—	—	34	46
Geriatric								
rehabilitation	48	1810	—	—	11708	47080	0.4	4
Geriatric long-stay	300	3750	—	—	67270	183694	0.4	2

Source: Donaldson, L. J., Stoyte, T. F. and Clarke, M. (1979). Fractured neck of femur in Leicestershire. *Public Health, London*, 93, 285-289

*A study of fractured neck of femur using HAA data.* This is an example of a method of analysing and presenting information in a more precise and scientific manner. Anecdotal evidence suggests that in many parts of Britain, serious problems are being posed by fractured neck of femur. This condition is common in the elderly (particularly women) and is likely to become more common as the population ages. Femoral neck fracture occurs at a time of life when increasing frailty means that the person's independence within the community is tenuously maintained. After admission to hospital, many patients are unable to regain their pre-fracture level of independence and their stay in hospital is prolonged, thus (in the eyes of many) 'blocking' the bed from receiving new admissions. Hearsay is not a sufficient basis for planning or management decisions, but it is relatively simple to use information obtained from HAA to highlight the problem. Table 1.5 shows the outcome of the acute admission for patients with this diagnosis. About a fifth of patients die and amongst the numerically important group, elderly women, only 24% were able to return home directly. Length of stay was never shorter than three weeks and was closer to eight weeks in women awaiting transfer to geriatric long-stay hospitals. Table 1.6 shows the work load imposed by these patients on various parts of the service. Almost half the work of the acute orthopaedic service (which includes a preconvalescent element) was taken up by these cases. Such information can be used by orthopaedic surgeons, geriatricians, nurses, social workers and health service planners as a basis for joint discussion to see what steps need to be taken to resolve the problem.

## **(2) General practice data**

### *The general practitioner list*

The cornerstone of the National Health Service has always been the system of primary medical care whereby patients look initially to their own general practitioner when they are ill (see also Chapter 4). The vast majority of the population is registered with a general practitioner, even if they may not often consult him. The average list size of a general practitioner in Britain is 2275 people, but with the tendency towards group practice, either in health centres or other premises, the numbers of people belonging to a partnership of GPs is much greater. About 60% of patients consult their GP in any one year and (this figure is greater for certain age groups, e.g. the pre-school child and the elderly) the average number of consultations per patient is estimated to be 4.5 per annum.

*Record keeping in general practice*

At present, the general practitioner records the details of each consultation on a medical record which consists of a card which is in an open-ended manilla envelope bearing the patient's name, date of birth, address and other details. Hospital reports, correspondence and the results of blood tests or X-rays are put into the envelope along with the record cards. There is no standardized way of recording clinical information and very often, because of pressure of time, because he carries many details in his memory and does not wish to add bulk to the medical record, the general practitioner's record of a consultation will comprise a few words or at most a few sentences. This contrasts with most hospital records of an episode of care which comprise several pages of longhand. The form of GP record-keeping was introduced in 1920 when there was a larger proportion of single handed practitioners with fewer patients and a more stable population and much more home visiting. The doctor knew most of his patients well and needed to make few notes, but found the envelope record which he could put in his pocket very convenient. However, today circumstances have changed and the GP record seems inappropriate and small. A move to A4 size (22.3 × 29.8 cm) records has started in some practices, but it is by no means universal, mainly because of the cost. This record gives much more space and is compatible in size with hospital records.

*The age-sex register.* Most general practices file records alphabetically by the surname of the patient. This is essential to allow the receptionist to retrieve the correct case notes when a particular patient attends for consultation. It does not, however, enable the general practitioner to identify particular groups (e.g. all schoolchildren) within the practice population. The general practice age-sex register is a file of the practice population arranged by age and sex. It usually employs small index cards bearing the name, sex, date of birth and address of each patient, possibly together with other details (e.g. NHS number). These cards are then filed in age bands for males and females separately. It has been estimated that about 1000 British practices now have age-sex registers. With the growing availability of relatively cheap microcomputers, it is likely that this manual system will be replaced in many practices with a computerized age-sex register, perhaps adding other data on each patient (e.g. for repeat prescriptions or the presence of chronic illness such as diabetes).

The age-sex register, a relatively simple device, can give the modern general practitioner invaluable assistance in a number of ways. It can provide a list of the names of patients in particular age-sex groups for which special preventive or surveillance measures can then be organized. For example: the very elderly (who may be visited regularly

at home); pre-school children (who are given a full course of immunization and vaccination); young and middle-aged women (who may be offered cervical cytology tests).

In addition, the register can serve as a denominator for the calculation of age- and sex-specific rates or be used as a sampling frame for research studies.

None of these tasks would be possible using the normal alphabetical method of filing practice records without great difficulty and expenditure of time. The main problem with the age-sex register is maintaining it in a valid and accurate way. Problems arise when administrative deficiencies lead to delays in removing people from the register who are no longer patients with the practice (e.g. deaths, migration) and in failing to up-date the list with new arrivals. To overcome these problems it is necessary to review the details on the registers at regular intervals, and to be aware of these difficulties when utilizing the register.

### *National Morbidity Study of General Practice*

No details, either clinical or administrative, of all general practice consultations are routinely collected either locally or nationally. The richness of general practice as a potential source of data on morbidity in the population led in the period 1970–1972 to the setting up of a National Morbidity Study of General Practice, organized jointly by the Royal College of General Practitioners (RCGP), the Office of Populations Censuses and Surveys and the Department of Health and Social Security (DHSS). This was a more elaborate version of an earlier study which had been carried out in the early 1950s. In all, over 50 practices were involved, giving a total study population of up to 300 000 patients. An age-sex register was first established in each practice and data were collected by the general practitioner, entering each episode of illness in a diagnostic index. An 'episode' was defined as a 'period of sickness' in which a number of consultations could take place. Diagnoses were stated in terms of a standard classification adapted (by the RCGP) from the International Classification of diseases. Other details recorded included date and place of first and subsequent consultations and whether a referral was made (e.g. as hospital inpatient or outpatient, to local authority services, chiropodist). The main study ended in 1972 but the scheme continued in a smaller group of about 20 practices for a further four years. In 1981–1982 another national study was carried out in approximately 50 practices.

### *Uses and limitations of general practice morbidity data*

General practice as a source for morbidity data of the community has

many attractions: a high proportion of the population are registered with a general practitioner; it deals with the wide range of less serious disorders which do not present to hospital; it allows greater insight into the early stages of the natural history of illnesses; and in the majority of cases it is the point of entry into the health-care system. It does not, of course, tell us anything about illnesses which are unrecognized by the patient or for which the patient undertakes self-medication. A more serious drawback, however, is that there is no system operating routinely to collect such data from general practice. Such a system would have to be set up along the lines of the National Morbidity Study so that illness was recorded and classified in a standardized way. The National Study was not a random sample of general practitioners (although they were chosen to represent different regions of the country). An enthusiastic general practitioner who wishes to participate in such a study is unlikely to be representative of all general practitioners, so the results may not be typical of the country as a whole. The incentives for setting up a system comprehensively are not good: there is no item of service payment as exists in some countries.

Despite its limitations, the National Morbidity Study of General Practice is the best guide to patterns of less-serious illness, both within subgroups of the population and for different parts of the country. Moreover it can be used as a starting point for a more detailed look at an individual problem.

### **(3) General Household Survey**

One way of obtaining information on illness which does not present to health service agencies (either general practice or hospital) at all, is to choose people from the general population and obtain information about their health directly. The General Household Survey (GHS) includes the collection of such information.

This Survey began in 1971 and consists of a carefully designed rotating representative sample of 15 000 private households (about 31 000 people) in Britain each year. Interviews are conducted throughout the year with the adult members of these households and in addition parents are asked for details of each child in the household under 16 years of age. The information collected is not restricted to health; indeed, the survey serves many government departments and includes questions on: employment, leisure activities, education, income and the family. The questions on health relate to medicine-taking, episodes of acute illness, presence of chronic illness or disability (including undeclared illness), consultations with doctors, use of other health or local authority services (including visits to hospital and membership of waiting list) and smoking habits.

*Uses and limitations*

The main limitation of the GHS is that since it relies on the evidence of the individual, errors may be introduced due to forgetfulness, differing perceptions of illness, or withholding certain information. Moreover, diagnostic labels are attached to the illness by the patient. Although the interviewers, who are not medically qualified, are trained to probe for as much clarifying detail as possible, they are unlikely to conform with the terminology or accuracy of a medical practitioner's diagnosis.

Despite these disadvantages, the GHS enables major and minor illness to be described in the population as a whole. It avoids the disadvantages of data systems which monitor contact with health services in that it seeks to count both declared and undeclared illness. It is collected along with information on a wide range of other subjects, thus it allows associations between such variables and health indices to be explored in a preliminary fashion. Valuable information in trends over time in smoking habits by sex and social class shown in Table 2.7 (Chapter 2) is obtained from the GHS, but would not be available from any other source.

**(4) Registration of disease**

A register has four main characteristics:

- (a) it identifies individuals;
- (b) these individuals each have the same particular feature in common, which is the focus of interest for the register;
- (c) it is 'longitudinal' in that the information held about individuals is updated in a defined systematic manner;
- (d) it is based on a geographically-defined population. A wide variety of registers have been devised nationally, or for local use, or for short-term research projects.

A number of registers are currently maintained in the health field and serve a range of different purposes. Many can supply useful information on the health of a population or the use of health services. Examples of some common registers are: cancer registers, 'risk' registers for children, general practice age-sex registers, psychiatric case registers and local authority registers of physically handicapped people (including the blind). These registers (except for cancer registration) are also discussed elsewhere in the book.

*Cancer and other types of disease registers*

The National Cancer Registration scheme has been operating since the end of World War II. It is organized on a Regional basis and information is also processed nationally by the OPCS. Each Regional Cancer Registry holds registration cards with details of the patient's



identity and of the type of neoplasm for all people in the Region who have been diagnosed as having cancer (certain premalignant tumours are also included). There is some Regional variation in the extent to which information on clinical stage of tumour and details of initial and subsequent treatment are recorded.

The National Cancer Registry at OPCS is notified by each Region of all new registrations by means of cancer abstract cards (or latterly, in some cases, by magnetic computer tapes). The items of data maintained on the national registry are as follows: identifying details, place of residence, sex, date of birth, place of birth, occupation (status and industry), site of primary tumour and type of growth, and anniversary date (of initial diagnosis). Date of death and duration of survival are determined by linkage to national death information.

Registers have been established to study other conditions such as: psychiatric illness, child abuse, ischaemic heart disease, stroke and trauma. It has been argued that the proliferation of such registers, accumulating large amounts of data, must incorporate checks to ensure high quality or their cost will not be justified. The availability of cheap, small computers and the growing interest of clinicians in automating records will mean that this will be an important issue in the future.

### *Limitations of registers*

One of the main problems of any registration system is achieving comparability of diagnosis. Wherever possible strict rules should be laid down, so that there are well-defined criteria which must be present before a particular diagnosis is made and so that an agreed classification is adhered to when labelling the disease. Variations in diagnostic and classification practices can give rise to problems when comparing data for different countries, different parts of the same country, or the same population over time. Duplication sometimes occurs, but with proper organization it is usually possible to identify whether an incoming record belongs to an existing registration or not. However, undercoverage (cases eluding registration) is an almost intractable problem with all registers. Most registers rely on some agreed procedure of notification of cases by health workers, with varying degrees of success.

Even in a cancer registration system where most cases would be expected to come to the attention of recognized treatment centres at some stage during the illness, under-reporting is a problem. Sometimes registers are not designed to give complete cover of a condition. Psychiatric case registers, which are hospital-based, are limited and do not contain information about the many people with psychiatric disorders who never present to hospital.

To maintain an effective case register is time-consuming and labour-intensive and thus expensive, not least because of the great difficulty and effort in keeping it continually updated: not only to record new cases but to remove those who have ceased to have the condition, have died, or moved out of the area. In practical terms often the success or failure of a register depends on the skill and enthusiasm of the person responsible for organizing it.

### *Uses of registers*

There are many ways in which registers can be useful to those responsible for the health of a community and much depends on the nature of the register itself. In the case of disease-specific registers (e.g. cancer, psychiatric), if the disease is one in which comprehensiveness of registration is high then data from registration can give a good guide to the incidence of that condition; this can enable risks in different sub-groups of the population to be determined and possible aetiological factors to be explored.

The element of follow-up in some registers can be exploited to provide valuable information. In the case of cancer registration, the fact that the death of each patient registered is eventually recorded allows the calculation of survival rates for different types and sites of tumour, and even for different treatment categories where this information is collected.

'Risk' registers were introduced in the early 1960s with the important objective of identifying those children who might develop handicapping conditions, so that early action could be taken. The original optimism and enthusiasm for these registers soon evaporated when they proved to be poor predictors of those children in the population who became handicapped. The registers which now survive are much more limited in their scope and objectives (this is discussed in Chapter 6).

Local authority registers of physically handicapped people are somewhat different because they record information about people with established handicaps. The purpose of these registers is to identify those who need help and to plan services for them. They are only partially successful in meeting their objectives in that they grossly under-register the true frequency of handicapping conditions as discussed further in Chapter 5.

### **Record linkage**

The process whereby medical records from two or more different sources and containing different types of information are brought together to provide a single file for an individual is called medical record linkage. The linkage of cancer registration data to death

certificate data (as described earlier) is an example.

With the advent of computer technology, one of the main routes for the development of morbidity statistics is likely to be through medical record linkage, a technique pioneered by the excellent Oxford Record Linkage Study<sup>3</sup>. A comprehensive personal record from birth to death, taking account of selected episodes of illness and contact with health services, would have great attraction both in epidemiological and clinical terms, but the problems of establishing and maintaining such records are formidable.

## SUMMARY OF METHODS OF INVESTIGATION

No attempt is made in this section to undertake a detailed account of the methods which are available to plan, collect and analyse special surveys of the health of populations, as many excellent texts provide such accounts. However, it is important that the reader has an overview of the main concepts and definitions and these are therefore provided.

### *Statistics*

The term 'statistics' is often used loosely to refer to a collection of numbers ('facts and figures'), sometimes qualified in relation to their source: hospital statistics, sickness statistics, home accident statistics and so on.

In the more precise use of the term, statistics is the science which is concerned with the collection, presentation, description and analysis of numerical data. The theory for this science is in the field of applied mathematics, but it has its own symbols, terminology and techniques.

Data can be presented and classified in various ways and this process is sometimes referred to as descriptive statistics. Beyond this basic approach the science of statistics may be used to test hypotheses and make inferences about a population based on a sample and this is referred to as inferential statistics.

'*Population*' in statistics is used in a technical sense to denote the entire constituents of the group of interest: not necessarily people but also objects such as hospital beds.

### **Describing and presenting data**

Data arise either in the form of a *count* (e.g. six people had the disease) or of a *measurement* (e.g. his systolic blood pressure was 110 mmHg). In the first case the variable of interest is the number with the disease and is termed 'discrete'; the variable can only take certain particular values, in this example 0 or 1 or 2 or 3, . . . etc. In the second case, the variable of interest is the blood pressure and this can take any value

dependent only on the refinement of the measuring process; such variables are called 'continuous'.

In presenting data from a continuous variable, particularly when there is a large number of measurements, the range of values that the variable can take is divided into intervals (usually equal) and the number of measurements that occur in each such interval (the 'class interval') is then noted (e.g. diastolic blood pressure may be grouped into 5 mmHg classes: less than 90, 90–94, 95–99 and so on).

### *Tables*

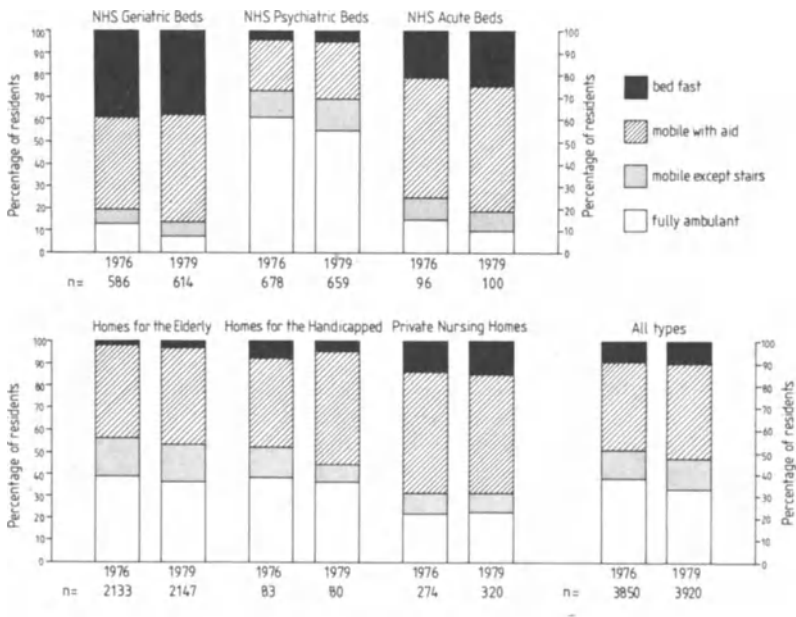
Tables are used extensively to present data and in their simplest form contain a listing of the categories or classes of the variable under study, together with the number of people or observations appearing in each (the frequency of observations). Table 6.11 shows the causes to which deaths in the perinatal period, in England and Wales in 1979, were attributed. The two left-hand columns of the table show the categories to which the deaths were assigned. The third column shows the frequency of observations (deaths) in each category and the fourth (right hand) column the percentage (relative frequency). The use of percentages allows easier comparison between different groups (in this case the importance of different causes of deaths) than if the absolute numbers alone were chosen. A similar approach can be used for measured data where class intervals are usually used, into which observations are then allocated. It is a common mistake to make tables unnecessarily complex and cluttered with detailed information, so that their impact is reduced. Tables must always have a heading describing their subject.

### *Diagrams*

There is a wide variety of ways of presenting data pictorially and this is probably the method of choice if the data are amenable to it.

**Bar chart.** Data can often be displayed conveniently and to good effect in the form of a *bar chart*. This allows a comparison of the frequency or relative frequency of different variables or between different classes of the same variable. The height of the bars indicates the frequency of observations in each category. For example, Figure 8.3 is a bar chart showing projected percentage increases in different age groups of the elderly population of England. It shows that the greatest increases are anticipated in the oldest age-groups.

The *proportional bar chart* is a modification of the simple bar chart, in which the bars are sub-divided and shaded to indicate the contribution or share which each category makes to the whole. A clear visual comparison is thus provided. Figure 1.11 consists of a series of



**Figure 1.11** Distribution of elderly people with different degrees of loss of mobility in each type of care, 1976 compared to 1979. Source: Donaldson, L. J. (1982). *Studies of the elderly in hospitals and homes*. M.D. Thesis: University of Leicester

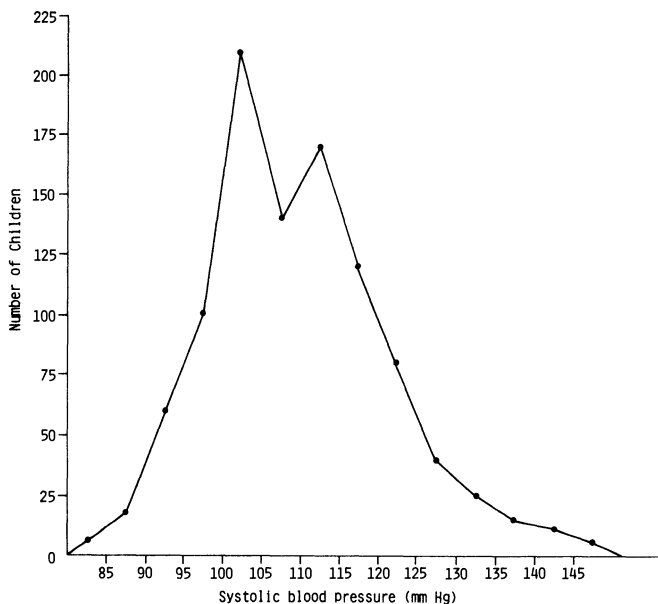
proportional bar charts. Their purpose is to indicate the proportion of elderly people with different levels of mobility in various types of care in both 1976 and 1979. Displaying the data in this way allows a direct comparison between the levels of incapacity being met in different care settings (e.g. geriatric beds or homes for the elderly), and also enables an impression to be gained about changes over time. It is usual to indicate (as is shown in Figure 1.11) by each bar the total number of observations on which the proportions are based.

**Pie diagram.** This is a circle (hence the term 'pie') divided into segments of such size to represent the relative frequency of certain characteristics. The pie chart is a popular method of presenting qualitative data and works best when the number of categories is about five or less. If too many sub-divisions of the circle are used, the visual impact is lost because it is difficult to distinguish the smaller sub-divisions. It is important that the categories used are exhaustive, so that a 'not known' category if present must be depicted. Figure 8.8 uses a pie chart

to show the proportions of old people within each elderly age group who are in each of the possible types of institutional provision (homes for the elderly, geriatric beds etc).

*Displaying frequency distributions.* It is very common to want to examine the distribution of the frequency of observations in relation to a variable of interest. Examples might include the number of people of different ages in a population, the number of cases of a disease in relation to different months of the year or the number of people with different levels of systolic blood pressure, e.g. Table 1.7. Such 'frequency distributions' can be depicted in a tabular form but can also be displayed in three main graphical ways:

- (a) A *frequency polygon* is constructed with horizontal axis representing the value of the variable under study (e.g. age, blood pressure) in ascending order and the vertical axis as the number (or frequency) or observations. The frequency in each class is then plotted at the class mid-point and the points connected by straight lines. An example of a frequency polygon is shown in Figure 1.12 which has been constructed using the data in Table 1.7.

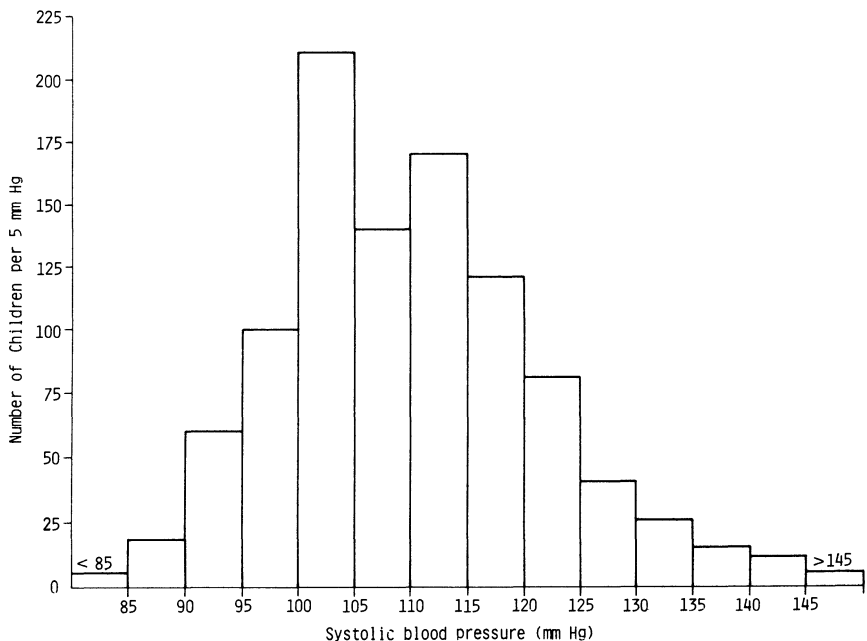


**Figure 1.12** Frequency polygon of the distribution of systolic blood pressure in 10-year-old children. Based on data from Table 1.7

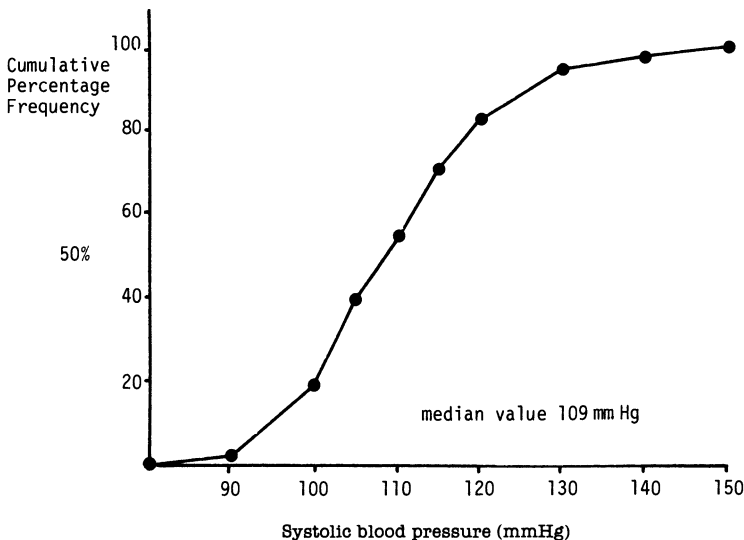
**Table 1.7** Distribution of systolic blood pressure for 10-year-old white children

<i>Systolic BP (mmHg)</i>	<i>Number of children</i>
< 90	17
90-99	111
100-104	145
105-109	97
110-114	118
115-119	83
120-129	83
130-139	28
140+	10
Total	692

Source: Pollock, E., Wines, W. and Hall, D. J. (1981). A survey of blood pressure in 10-year-old children in a health district together with a consideration of screening policy for hypertension. *Community Med.*, 3, 199-204

**Figure 1.13** Histogram of the distribution of systolic blood pressure in 10-year-old children. Based on data from Table 1.7

- (b) A *histogram* is a special type of bar chart with no space between the bars. The axes are the same as in the frequency polygon. It is constructed by drawing vertical lines at the upper and lower limits of the class interval. A horizontal line is then drawn across the top of the vertical lines to correspond with the frequency of observations on the vertical axis. The result, as shown in Figure 1.13, is a series of adjoining columns. The area of each column is proportional to the corresponding class frequency. If the class intervals are equal, the heights of the columns will represent the frequencies of observations in the classes.
- (c) The *cumulative frequency curve* is another important and commonly used method of representing a frequency distribution. In a simple frequency distribution, presented, for example, as a frequency polygon or histogram, the number of observations in each class is plotted separately. In the cumulative curve, the frequencies of observations in each class are successively added together.



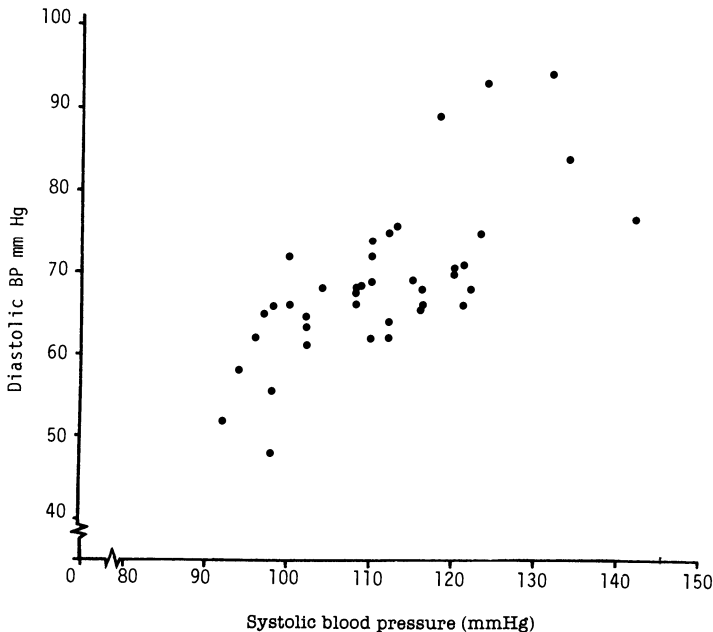
**Figure 1.14** Cumulative relative frequency curve of the distribution of systolic blood pressure in 10-year-old children. Based on data from Table 1.7



This process of accumulation of observations can be in terms of percentages (eventually reaching 100%) rather than absolute frequencies, in which case the curve is referred to as a *cumulative relative frequency curve* (CRF curve). In constructing the curve, cumulative percentage frequencies are shown on the vertical scale and are plotted against the upper end of the interval of the class and indicate the proportion of observations less than a given value.

Figure 1.14 shows the CRF curve for the data used in Figures 1.12 and 1.13.

A *scatter diagram* is used to demonstrate the degree of association between two variables (e.g. systolic and diastolic blood pressure). The pair of observations on each subject is plotted so that distance along the horizontal axis corresponds to systolic and the vertical axis corresponds to diastolic, to produce one point. Repeating the process for each subject gives a scatter of points. If the points lie in a



**Figure 1.15** Scatter diagram of systolic and diastolic pressures of forty 10-year-old children. Based on data from Table 1.7

straight line a linear relationship would be said to exist between the two variables. Sometimes it is possible to visualize a smooth curve, in which case the relationship is referred to as curvi-linear. More often neither situation is unequivocally evident and it is necessary to interpret the relationship between the two variables. Statistical methods of the regression and correlation exist to allow the nature and strength of the association between two variables to be determined (see Figure 1.15).

### Summarizing data

Aside from displaying frequency distributions in tabular or graphical form, there are important numerical summaries which can be used to describe them. These can be grouped into:

- (a) Measures of the 'centre' of the distribution;
- (b) Measures of 'dispersion' or 'scatter' of observations around the central value.

#### *Measures of centre*

The most easily understood measure of central tendency is the *arithmetic mean*. It is calculated by adding up the values of all the individual observations and dividing the resulting sum by the number of observations. The mean is a useful measure when the frequency distribution in question is symmetrical. In many cases, however, different concepts of middle are also useful. For example, the *mean* length of stay for hospital inpatients may be well away from the apparent centre of the frequency distribution of all lengths of stay, because of a large number of very short lengths of stay and a few very long stays. In this circumstance the *median* is the measure of centre that is often used; the median is the value which bisects a distribution so that half the observations lie above it and half below it. The median is obtained by arranging the observations in order from the smallest to the largest and choosing the middle value. It can be estimated very conveniently from the cumulative relative frequency curve by reading off the 50% point of the vertical axis and dropping a perpendicular to the horizontal axis. In the example shown in Figure 1.14 it is approximately 109 mmHg.

A third measure of centre is the *mode*; this is the value that occurs most frequently. On a graph it represents the peak. If there are two peaks the frequency distribution is said to be bimodal.

#### *Measures of dispersion*

The simplest measure of the dispersion of data is the *range*, the difference between the largest and the smallest of a set of observations. It is not a good summary of the dispersal of observations in a

distribution, however, because a single very high or very low value may give a false impression of the dispersal of all points.

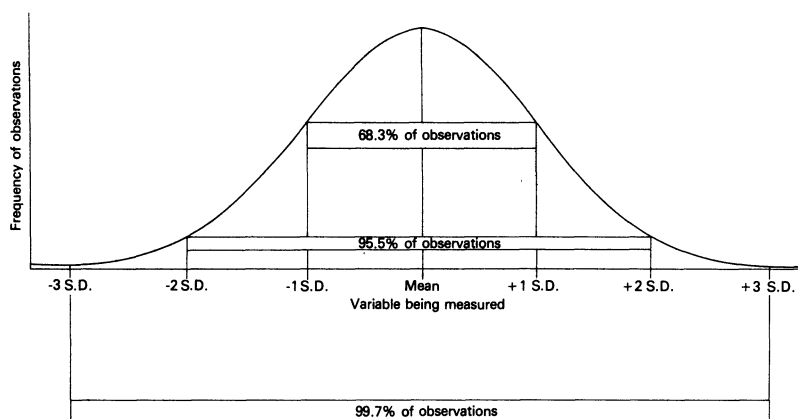
A more useful measure, not affected by extreme outlying values in this way, is the difference between different percentiles in a distribution. When a set of data is arranged in order of magnitude the value which separates the hundredth, or 1%, of observations from the rest is the first percentile and each further hundredth, or per cent, the corresponding percentile (second, third etc.). The percentiles which divide the distribution into quarters (i.e. 25th and 75th percentiles) are called *quartiles*, whilst the 50th percentile as has previously been mentioned, is the median. The *deciles* divide the distribution into ten equal parts. The range between any two percentiles can be chosen as a summary of the dispersion (e.g. 10th and 90th or 20th and 80th) but commonly the *interquartile range* is chosen (i.e. difference between 25th and 75th percentile).

A third and widely used summary of dispersion of observations within a distribution is the standard deviation. The *standard deviation* is a mathematically important measure of the scatter of individual observations around the mean. Its calculation involves the values of all observations. A wide scatter of observations around a mean would give rise to a large standard deviation and values closely grouped around the mean would give a small standard deviation. It is calculated as the square root of the mean of the squared differences between the values and the mean of the distribution.

### *Shape of distributions*

Another important feature of a frequency distribution is its shape, and in particular, whether or not it is symmetrical. In a perfectly symmetrical distribution, observations fall evenly at similar points above and below the mean of the distribution. An especially important symmetrical frequency distribution in statistics, particularly as applied to data in biology and medicine, is the normal distribution. It has the following characteristics (see Figure 1.16):

- (i) It is a bell-shaped symmetrical distribution which is unimodal, curving downwards on both sides from the mean towards the horizontal axis (point of inflexion) but never touching it.
- (ii) The mean, the median, and the mode of the distribution are identical.
- (iii) Between the mean and certain multiples of the standard deviation on *either* side of it are contained fixed proportions of the observations in the distribution: 68.3% of observations are contained within one standard deviation above or below



**Figure 1.16** A normal frequency distribution showing the proportion of observation falling within various multiples of the standard deviation (SD) around the mean

the mean, 95.5% of observations are contained within two standard deviations above or below the mean and 99.7% of observations are contained within three standard deviations above or below the mean. What makes the normal distribution so important is that several of the measured biological characteristics of people in a population fit the normal distribution curve or almost so (e.g. height, weight, IQ). Its particular importance, however, is that it is at the basis of much statistical theory involved with the concept of probability and significance.

## SURVEY METHODS

### *Sampling*

In undertaking surveys it is usually impossible to be able to study each member of an entire population to determine, e.g. the frequency with which they suffer from a particular disease. From such a population, a smaller group or *sample* will usually be examined in detail and, from it, inferences will be drawn about the population. A number of important considerations should be borne in mind when choosing a sample, but uppermost is the need to appreciate that in taking a sample the underlying objective is to make true statements about the population itself.

The technique of drawing a sample has an important bearing on this process. There are two main ways of obtaining a sample of people for survey purposes:

- (a) the quota method; and
- (b) randomly.

The quota sample is often employed by market research organizations. This method involves the interviewer seeking a certain number of people to fit into a pre-agreed sample configuration. A certain number of men or women of particular ages or social backgrounds may be sought out by approaching people in the street, for example. This type of sampling is generally unsatisfactory because it is unlikely to result in a sample which is representative of the whole population. A sample of middle-aged men drawn by quota sampling in a shopping centre in mid-morning, for example, would be unlikely to be truly representative of all middle-aged men in the particular town. Groups such as the unemployed or shift workers would tend to be over-represented.

The basic and most commonly used sampling method in survey research is the random sample. There are a number of different ways of obtaining a random sample, but all have the following in common: the results can be generalized to the total population from which the random sample was derived and probabilities calculated for possible differences between the unknown true value and the value obtained from the sample.

The first step in drawing a random sample is to construct a suitable sampling frame. A *sampling frame* is merely a list (actual or notional) of the population. The nature of the sampling frame will vary according to the purposes of the survey. A sample for a survey of infant feeding practices might be drawn from all birth registrations in a particular area or in a survey of occupational diseases, the sampling frame might be the employment records of particular firms.

Many surveys in community medicine will aim to conduct an investigation in a sample of the population of a geographically defined area: say a district health authority. Obtaining a suitable sampling frame, i.e. a list of the residents of that authority, from which to draw a suitably sized sample survey is not a straightforward proposition. A traditional approach is to use the electoral roll, which supplies a list of people qualified to vote listed by the street within the different electoral wards of a town or city. As a sampling frame representative of the general population, however, this has serious limitations. The most obvious is that people below voting age are excluded. In addition, the rolls are often out of date as people move into or out of the area.

As more general practitioners have joined into large group practices, the potential for the use of age-sex registers as representative sampling frames has increased. It is important here, too, to realize that the register may be inflated by people who have died or left the area, but

whose names have not yet been removed from it.

Having obtained a suitable sampling frame, there are a number of different approaches to obtaining the random sample. The most direct is to choose people at random from the sampling frame until the required sample size is achieved (*simple random sample*).

A simple 10% random sample of a population of 1000 people would involve picking at random 100 names from amongst the 1000 listed. It is absolutely essential however that each time a name is chosen, *every individual has an equal chance of being picked*. One technique for ensuring that this is the case is through the use of a table of random numbers. In the example above the people in the population are numbered from 000 to 999. Using a special table of random numbers, 100 numbers are then picked and the people corresponding to the numbers listed become the sample.

Another approach is to draw a *systematic random sample* in which individuals are picked from the sampling frame in sequence. A 10% random sample drawn in this way would involve choosing every 10th name on the list (a 1 in 10 sample), only the first selection being made from the table of random numbers.

This is often a much more convenient way of drawing a sample. Systematic sampling is usually a perfectly satisfactory method, but it depends on people or items listed on a sampling frame being arranged in a way that does not introduce bias. For example, a 1 in 10 systematic sample drawn from a list of married people in which the husband's name always came first would result in either every person chosen being female or every person being male.

**Stratification.** This may be used to ensure adequate representation of different sections of the population. The population is divided into sections or strata, for example social classes, age groups, or places of residence. A random sample is then drawn from within each stratum. Stratified sampling has the additional advantage that it allows a different size of sample to be taken from each stratum. It is also more efficient in that for the same precision of the final estimate a smaller total sample size is required compared to that required for a simple random sample.

**Multistage sampling.** This is often a convenient technique in large surveys. For example, a survey of lung disease in steel workers might take as its first-stage sampling frame a list of all towns with steel works. Having chosen an appropriate number of towns randomly, a second stage sampling frame consisting of the names of employees could be drawn from the towns which had initially been chosen. The workers for examination would then be drawn at random from the second frame.

The advantage of having adopted a two-stage sampling technique is clearly that the need to draw up a named list of steel workers in the country was by-passed, thus saving time and avoiding difficulty and cost to the investigators.

### *Alternative survey designs*

A number of approaches can be used to conduct surveys which are designed to collect data from individuals or about events. The choice of method depends mainly on the purpose of the investigation, but also on the time by which an answer must be known and the resources available.

### *Cross-sectional (prevalence) studies*

Health data which are routinely available are usually restricted to people who are in contact with health services. They give an incomplete picture of the frequency and distribution of a particular disease in a population, because they cannot give data on people who have the disease but do not seek treatment. In order to plan services or identify subgroups of the population with a particularly high frequency of a disease it is sometimes necessary to conduct a special survey to determine its prevalence.

The steps in conducting such a survey are shown in Table 1.8. It is seldom possible to examine all members of a population, so it is necessary to draw a representative sample.

**Table 1.8 Steps in carrying out a cross-sectional study**

- 
1. Formulate aims
  2. Choose a study population
  3. Select a suitable sampling frame
  4. Draw a sample
  5. Decide upon criteria for disease or characteristic being measured
  6. Choose a technique of measurement
  7. Standardize measurement technique
  8. Carry out measurements
  9. Evaluate the results
- 

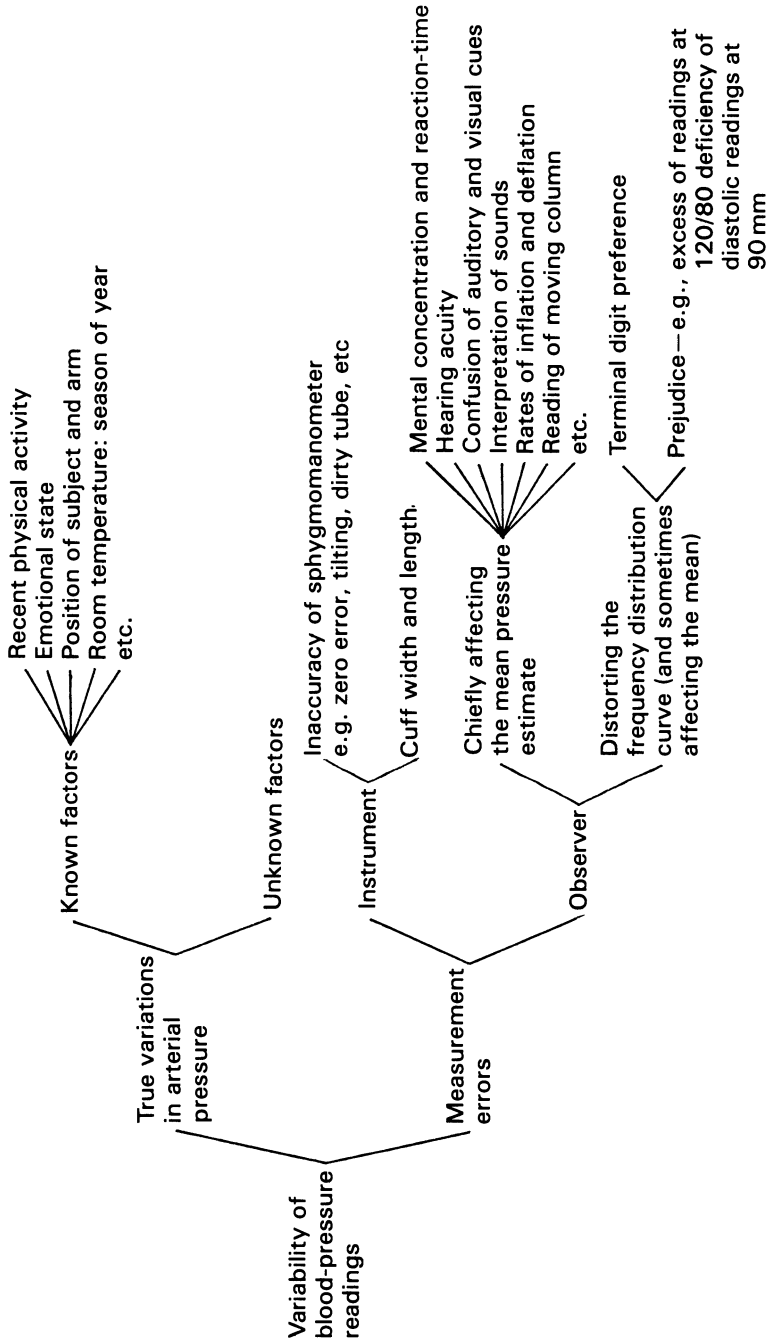
The next step is then to agree on an operational definition of the disease or characteristic under study and the method by which it is to be measured or detected. These are most important considerations. Even a formally stated definition of a condition may be of little practical value in conducting a survey to determine its prevalence. It is necessary

Table 1.9 Diagnostic criteria for rheumatoid arthritis

Criterion no.	American Rheumatism Association (Rome) criteria, 1961	Criterion no.	New York criteria, 1966
1	Morning stiffness	1	A history, past or present, of an episode of joint pain involving three or more limb joints but without stipulation as to duration
2	Pain on motion or tenderness in at least one joint	2	Involvement by swelling, limitation of motion, subluxation or ankylosis of at least three limb joints; there must be symmetry of two of the joints involved
3	Swelling in at least one joint	3	X-ray features of Grade 2 or more erosive arthritis in the hands, wrists or feet
4	Swelling of at least one other joint	4	Positive serologic reaction for rheumatoid factor
5	Symmetrical joint swelling		
6	Subcutaneous nodules over bony prominences, on extensor surfaces, or in juxta-articular regions		
7	X-ray changes typical of rheumatoid arthritis		
8	Positive rheumatoid factor test		

Source: Hochberg, M. C. (1981). Adult and juvenile rheumatoid arthritis: current epidemiologic concepts. *Epidemiol. Rev.*, 3, 27-44





**Figure 1.17** A systematic representation of some sources of variation in measuring blood pressure. Source: Rose, G. A., Holland, W. W. and Crowley, E. A. (1964). A sphygmomanometer for epidemiologists. *Lancet*, 1, 296–300

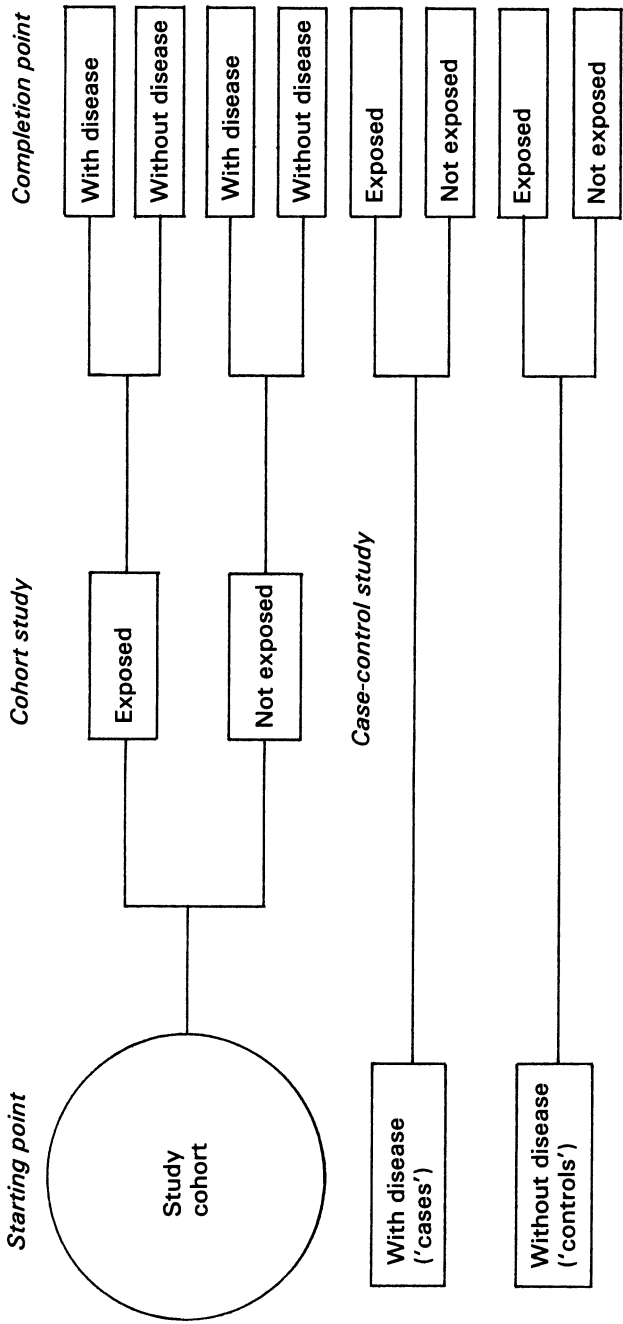
to agree and lay down strict criteria which must be fulfilled in order that a person is counted as having the disease. Table 1.9 shows two approaches which have been used in obtaining a list of criteria to define rheumatoid arthritis. It illustrates the contrast with the clinical situation where the features of an illness which are taken as the basis for attaching a particular diagnostic label may vary markedly between different doctors. The reasons underlying those decisions may not always be apparent. In planning a prevalence or other type of survey, it may not be an easy matter to agree on what such criteria should be. It is, however, essential to resolve and adhere to a working definition or the results collected will have no meaning outside the context in which they are collected.

Variation between measurements is another important consideration in a prevalence survey, and as the example of the measurement of blood pressure shows (Figure 1.17) it can have a wide variety of sources. The main concern is with systematic variation or bias.

Some variation can be reduced by standardizing the procedures in the study as, for example, when physical examinations are being carried out. This will best be ensured by training examiners and checking their technique for departure from the standard at intervals during the conduct of the study. If interviewers are being used to elicit information from members of the study population by questionnaire, they must be trained. This can be done by recording pilot interviews on videotape; thus the interviewers and the study organizers can assess the results together and correct any faults in technique.

Variation arising from instruments can be reduced by introducing a strict quality control. In studies using laboratory measurements, test solutions or reagents can be employed to ensure standardization.

A number of difficulties can arise when interpreting data from prevalence or cross-sectional studies. First is the problem of non-response or non-cooperation. The planning and organization of the study should be geared to obtaining the highest possible recruitment of the sample under investigation. It is inevitable, however, that some degree of non-response will remain, even after the most strenuous efforts to reduce it. The main concern with non-response is that the non-responders are unlikely to be typical of the remainder of the sample. Depending on the circumstances they may be more or less likely to suffer the disease under investigation and hence their omission is likely to lead to bias when drawing conclusions from the results of the sample. Aside from initial attempts to keep non-response to a minimum, when it does occur the usual approach is to obtain as much indirect evidence as possible about the non-responder so as to make an estimate of the kind of bias which may be introduced by their omission. A second technique is to sample the non-responders and make extra



**Figure 1.18** The main features of cohort and case-control studies

efforts on this group to gain their cooperation.

A further problem in interpreting data from cross-sectional studies is the need to be fully aware that the population being dealt with is a survivor population, i.e. if the disease has an appreciable mortality the most severe cases will have died and any cross-sectional study will not include the entire spectrum of disease.

*Cohort and case-control studies.* One of the most important areas of investigation in community medicine is the exploration of hypotheses involving factors causing disease. It is of particular importance because if such links can be established, then there may be scope for prevention by intervening against causal agents.

A causal hypothesis may spring from clinical impression, from laboratory observations or from examining descriptive data in populations in relation to time, place or person (see Chapter 2).

There are two main approaches to investigating causal hypotheses: cohort and case-control studies (Figure 1.18). A *cohort* is a group of people who share a similar experience at a point in time. A birth cohort is people born on a particular day or in a particular year and a marriage cohort, those married in a given year. People residing in a particular geographical area or workers in an industry at a certain time also constitute a cohort. The essence of a cohort study is that the members of the cohort are first characterized according to whether and to what extent they have been exposed to the hypothesized cause. Then they are followed-up *over time* to determine whether they develop the disease under study. In a cohort study investigating a causal hypothesis, the precise choice of cohort will depend on the nature of the disease under investigation. The cohort might be a group of people who have been exposed to a particular hazard (e.g., the Japanese who were exposed to radiation following the atom bomb explosion).

If the intention is to test the hypothesis that smoking causes lung cancer, the initial step is to classify the study cohort into smokers and non-smokers. The cohort is then followed up over time and cases of lung cancer are detected as they occur. The results would then be analysed to show what proportion of the smokers developed lung cancer compared to the proportion of non-smokers.

In contrast a *case-control study* begins by assembling a group of people with the established disease ('cases') and a group who do not have the disease ('controls'). Then for each 'case' and 'control' it is determined whether they have been exposed to the factor under study.

For example, if it is also the intention to investigate the same hypothesis that smoking causes lung cancer but this time using the case-control approach, the investigation begins by taking people with lung cancer and suitable controls who do not have lung cancer.

Controls may be matched with cases for characteristics like age, sex and social class with the purpose of eliminating such characteristics from the analysis of causation. Enquiries are then made to discover how many of the lung cancer patients were smokers and how many of the control patients were smokers.

The choice of whether to conduct a cohort or a case-control study depends on the conditions being studied and the resources available. The main attraction of the case-control study is that it is relatively quick and cheap to undertake. A cohort study usually involves the following up of individuals over a long period of time. Consequently it is labour intensive and costly and the result of the study may not be known for some considerable time. A further consideration relates to how common the disease is which is the subject of investigation. If the disease is rare, the case-control study may be the only practical option. The number of individuals which would need to be recruited to a study cohort to yield sufficient cases of a rare disease would be prohibitively high.

Because the members of the study cohort are followed up over time there is a possibility of losing some of them. Such attrition may arise from death from conditions other than the one under study, migration or refusal to cooperate in the study. Bias may also be introduced here if such losses become large. The cohort study does have the extra advantage that it may uncover previously unsuspected links between the exposure factor under study and other diseases, not merely the disease being investigated.

The case-control study is not without drawbacks, however. Uppermost amongst these is the fact that since data on the exposure are obtained retrospectively, information may be incomplete; this becomes a serious problem likely to produce a spurious result if there is a difference in the degree of completeness between cases and controls. In obtaining data on exposure retrospectively from medical records of lung cancer patients and hospital patients with other diseases (used as controls), it would be more likely that a smoking history would be recorded in the lung cancer patients because of the known association between that disease and cigarette smoking than in those with other diseases. A further potential source of bias arises when exposure data are obtained retrospectively by interview. A person with the disease may be more likely to remember or report an exposure (perhaps because he is trying to rationalize the presence of the disease) than a person serving as a control who is disease free. This issue is also discussed in Chapter 3.

Both cohort and case-control studies are observational in nature. To investigate hypotheses of cause and effect they rely on observing real life events: people who are exposed or expose themselves to risk factors

and those people who develop disease. If an association is found it is possible that the relationship between exposure and disease is not in fact one of cause and effect. The steps in weighing the evidence for an association being causal are also described in Chapter 3.

### *Clinical and preventive trials*

Another type of study design which is not observational in nature, as are cross-sectional, cohort and case-control methods, is the so-called 'intervention' or 'experimental' design. This is usually in the form of a randomized controlled trial (RCT), whose main stages are shown in Table 1.10. In it, two or more groups are assembled, they receive particular courses of action (e.g. treatments, health education messages, dietary modification) and are then monitored to detect events which are hypothesized to result from these actions (e.g. relief of pain, improvement in health, loss of weight).

**Table 1.10 Steps in conducting a randomized controlled trial (RCT)**

- 
1. Formulate aims of study
  2. Lay down criteria about the nature of the intervention (treatment or preventive measure), the conditions of administration, and the assessment of outcome. Ensure blindness where possible
  3. Decide on criteria (diagnostic, age, etc) for inclusion in and exclusion from trial
  4. Recruit the study population
  5. Allocate the study population randomly into intervention and non-intervention (control) groups
  6. Administer intervention
  7. Evaluate the results
- 

The best established context of RCT is the *clinical trial* in which new therapies are assessed in comparison with old methods of treatment or placebos ('dummy' treatments).

Once the aims of such a trial have been precisely laid down, it is necessary to assemble suitable patients for study and allocate them into each treatment group.

The main feature of the experimental method which sets it apart from observational studies is the aim of producing groups of patients comparable in respect of features known to affect the outcome, except for the different interventions which it is planned that they will receive. Other unknown differences may still be present. The means of negating their effects and enabling valid inferences to be made is through the process of *randomization*. The process involves dividing the group of

subjects (or any subgroup or subgroups with particular characteristics) into two parts, one part becoming the 'experimental' group and the other the 'control' group. In this way any bias in the allocation procedure is avoided. Once patients have been found to be eligible for the trial on the basis of diagnostic and other criteria previously laid down, then randomization takes place. It is an essential requirement that after eligibility for the trial has been confirmed, no further influences can be brought to bear on whether patients are allocated to particular groups. Anything other than random choice (e.g. the deliberate placing of very ill patients in a non-treatment group) will introduce bias.

There are various techniques through which randomization can be accomplished: for example, the use of random number tables or the opening of sealed envelopes containing the treatment category.

A precise specification of the nature of the treatments or other measures to be used is also necessary, together with rules for the method of administration or the conditions under which the treatment should be administered. For example, in the evaluation of a preventive measure criteria might be laid down as to who is to administer say, a health education message, whereas with the treatment the route of administration of a drug must be specified.

Consideration of the assessment of the outcome of the trial in 'intervention' and 'non-intervention' groups introduces another important principle – that of *blindness*. There is a danger of bias when either the patient, the clinician or investigator (who is responsible for assessing outcome) is aware of which groups have received the intervention as opposed to the non-intervention (control) measures. This source of bias can be minimized by engineering a situation when neither the patient nor the investigator is aware of which experimental group is the intervention group – a *double-blind* study.

This is most easily accomplished in clinical trials of medications when a placebo preparation can be made up with the same appearance as the therapy being evaluated. The two treatments are then simply labelled as, for example, A and B. The code revealing which is the active treatment and which is the dummy is then broken only at the end of the trial. Blindness is much more difficult to ensure in preventive trials.

Clinical trials of therapies are much more commonplace than RCTs evaluating preventive measures. This is, in part, because of the difficulty involved with large numbers of subjects being required and a long time span to await the appearance of outcome measures. Perhaps the most frequently occurring type of preventive trial is the trials of vaccines that have been carried out. However, a number of RCTs of coronary heart disease preventive measures have been conducted<sup>4</sup>, as

well as a small number in the field of screening, e.g. breast cancer (see Chapter 2).

The importance of the RCT to the evaluation of health services, though infrequently applied, has been emphasized by Cochrane's writings<sup>5</sup>.

#### ETHICAL ISSUES

In the conduct of a study involving human populations a strict ethical code must be obeyed. In the context of clinical trials the World Health Organization has laid down a strict code of practice<sup>6</sup>. Ethical issues equally well apply to observational studies. Most district health authorities maintain an ethical committee to which proposals for medical research are sent prior to the study being initiated.

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## Patterns of disease

### INTRODUCTION

In Chapter 1 the ways in which information on the health of a population is gathered were described: demographic information from the census; data on deaths from different causes (mortality data) and data on particular illnesses or diseases (morbidity data).

The step after acquiring such information is often to see whether the distribution of a health problem is uniform throughout a population, or if there are some groups which are affected to a greater or lesser extent than others.

If differences exist, and they are real, then it may be possible to identify groups at high risk for particular diseases. The identification of groups with different risks could enable services to be directed to them or provide the starting point for an investigation into possible causal factors, a pathway which might ultimately provide scope for prevention. This is the area covered by *epidemiology*, a science basic to community medicine. It is concerned with the study of the distribution of diseases within populations and the factors which cause them, and can be used as the basis for formulating preventive strategies. The techniques and approaches of epidemiology can also be used as a scientific foundation for those concerned with the rational planning of health services and with critically appraising the effectiveness and efficiency of both services and patient therapies.

It must be emphasized that describing the pattern of disease in a population provides only an initial impression, not conclusive evidence of groups at high and low risks. More detailed and planned studies must follow before such conclusions are drawn.

This chapter begins by examining the ways in which disease may be described in populations: the way in which it varies at different periods of time, in different geographical locations and within different sub-groups of the community. In the final section, a detailed description is given of the main features of a number of individual diseases.

**Are differences real?: three important questions**

The key issue when making comparisons of disease frequency is to ensure that observations are being made using information which is in fact comparable.

It is crucial not to assume that a higher frequency of disease in one place compared to another, or one occupational group compared to another, necessarily means that there is a real difference between the two. In determining whether differences truly reflect different levels of a particular disease, three important questions must be posed.

**(1) *What are the criteria for defining the disease?***

It is well known that there are variations in medical practice (between different time periods, different countries and even individual doctors on different occasions) which influence the way in which a particular diagnosis is applied to a particular condition.

One example given in Chapter 7 is the variation between the United States and the United Kingdom in what criteria psychiatrists would use to make the diagnosis of schizophrenia.

**(2) *Have all cases of the disease been identified?***

False impressions about the amount of disease in one population compared to another may be gained through failure to take account of differences in the efficiency of case detection.

For example, the observation that the frequency of a particular cancer is commoner in a Western country compared to a developing country, using cancer registration data, may lead to speculation about risk factors in the two countries. Such a line of thought would be unwise without first examining the efficiency of the two cancer registration systems. The apparently higher occurrence of the cancer in the Western country may simply reflect the fact that it has an efficient, well-maintained cancer registry which detects and records most cases of cancer which occur. The cancer registry of a developing country, perhaps covering a rural population who do not readily have access to medical services, may not be so efficient at detecting cases of the cancer. But this does not necessarily mean that they are not occurring as often as in the Western country, merely that they are not being recorded. The only approach to resolving some of these difficulties may be by special international study in which standard criteria for disease definition and detection are laid down.

**(3) *Is the population at risk accurately defined?***

In any measure of disease frequency, it will be necessary to express the number of cases of the disease in relation to the population from which they arose. This is not always a straightforward proposition: hospital

catchment populations are commonly used denominators, yet they may change from time to time and may vary according to the group of diseases being examined.

Provided these limitations are always borne in mind when comparisons of disease frequency are being made, important observations may result from examining the pattern of diseases within populations.

## DESCRIBING DISEASE IN RELATION TO TIME, PLACE AND PERSON

Traditionally, there are three main ways of looking at the pattern of disease: in relation to *time*, in relation to *place* and in relation to *person*.

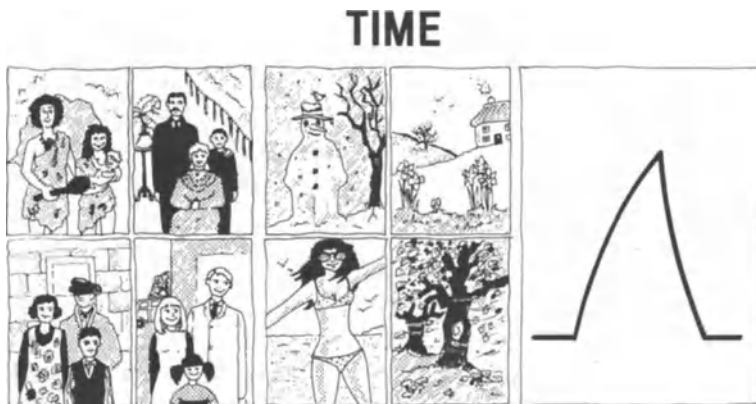
### Describing disease in relation to time

When describing the way in which the occurrence of a disease varies with time (Figure 2.1) there are three common methods of examining the relationship.

- (a) seasonal variation;
- (b) epidemics; and
- (c) long-term (secular) trends.

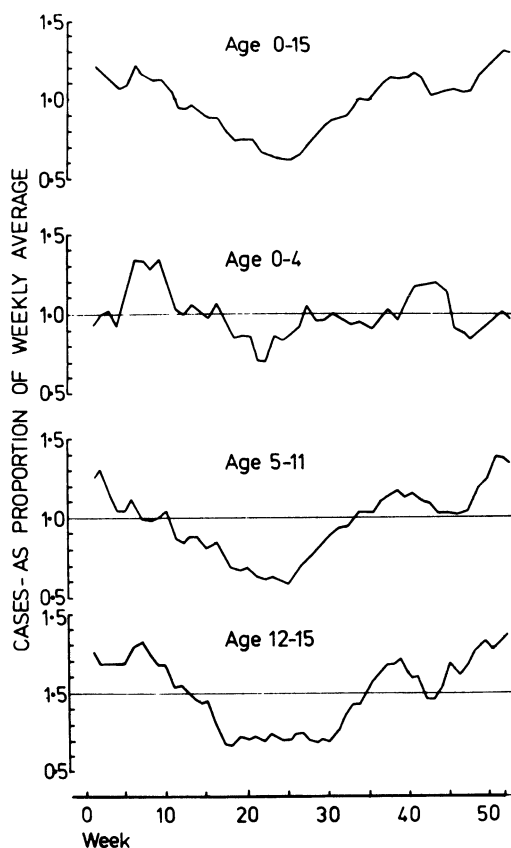
#### (a) *Seasonal variation*

Many of the infectious or communicable diseases exhibit seasonal variations in their occurrence: peaks in the frequency of these diseases



**Figure 2.1** Describing disease in relation to time: secular, seasonal and epidemic variation

occur regularly at particular times of year. Respiratory infections, for example, are more common in the colder months. In some non-infectious conditions seasonal variations have been clearly demonstrated, but no satisfactory explanation has, as yet, indicated why they should occur. For example, Figure 2.2 shows apparent seasonal variation in the onset of insulin-dependent diabetes mellitus in children. It can be seen that there is a higher occurrence in the winter months (January, February and December). Data of these kinds have led to suggestions that insulin-dependent diabetes in children may be



**Figure 2.2** Seasonal variation in onset of insulin-dependent diabetes in 3537 cases in the United Kingdom by age group (five-week moving averages). Source: Gamble, D.R. (1980). The epidemiology of insulin-dependent diabetes, with particular reference to the relationship of virus infection to its aetiology. *Epidemiol. Rev.*, 2, 49-70

caused or precipitated, in a small number of susceptible individuals, by an infectious agent, possibly a virus.

Such findings must be interpreted cautiously because they raise questions about the extent of detection of cases and the way in which the onset of the disease is determined. Even if such a seasonal pattern is established, this is not proof of a causal link between any particular infectious agent and the disease. However, it is an example of how examination of the pattern of disease can provide a clue which may prompt further investigation, which in turn may lead to a greater understanding of its mechanism.

### (b) *Epidemics*

The increase over a relatively short period of time in the frequency of a disease above its baseline level of occurrence is termed an 'epidemic' and as such is usually applied to communicable diseases (Chapter 9).

Sometimes the term is also used to describe increase in frequency, over a period of years, of diseases which have had a stable (and lower) level of occurrence for decades. Coronary heart disease and lung cancer are often referred to as the 'modern epidemics'. Trends over years, or decades and longer, however, are usually described as 'secular trends'.

### (c) *Secular trends*

The study of the pattern of diseases over long periods of time: years, decades, or even centuries highlights many changes. Major diseases of the past have faded from importance, whilst others have become increasingly prominent recently.

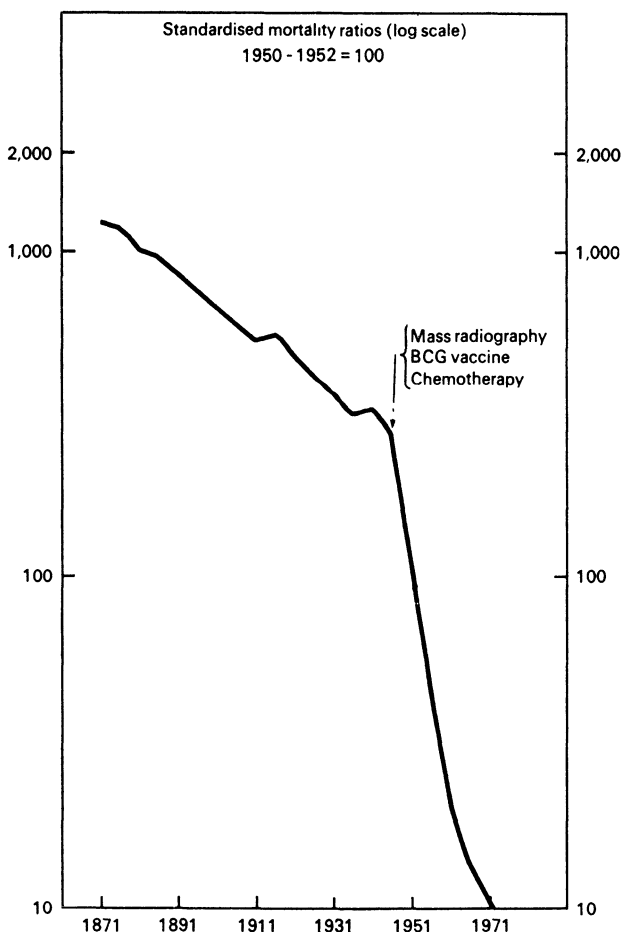


"Yet the captain of all these men of death that came against him to take him away, was the consumption, for it was that that brought him down to the grave." Bunyan

**Figure 2.3** Tuberculosis – a major killer of the recent past

There are many pitfalls in interpreting secular trends in the frequency of a disease. Its true frequency may not have changed over time but improvements in methods of detection and diagnosis, fashions in diagnosis, changes in the criteria used to define or classify it, may suggest that it has.

Some of the most spectacular secular changes in the pattern of disease in Western industrialized countries have involved the decline in the importance of the infectious diseases as major health problems and



**Figure 2.4** Mortality from tuberculosis: England and Wales (1871-1971). Source: Department of Health and Social Security (1976). *Prevention and Health. Everybody's Business*. (London: HMSO)

causes of death. The decline in infant and childhood mortality, largely as a result of general measures (sanitary reforms, improvements in living standards and nutrition) which reduced the impact of the infectious diseases, improved life expectation for modern Britons compared to their Victorian counterparts. This secular change in mortality from infectious diseases in turn, therefore, had wider implications beyond its immediate impact for the size and structure of the population.

Tuberculosis was one of the great scourges of the recent past, often referred to as the 'white man's plague'. Bunyan, in his writings gave it the chilling and evocative title 'Captain of the men of death' (Figure 2.3).

In 1855, for example, 13% of deaths from all causes were attributed to tuberculosis; by 1979 the figure had fallen to 0.1%. Although the disease is now a much less common cause of mortality and morbidity, it is still important as a health problem, particularly in immigrant groups (see Chapter 9).

The decline in mortality from tuberculosis (Figure 2.4) had begun before the advent of specific medical measures. This highlights another principle in interpreting secular trends. If the frequency of a disease is already declining it must not be assumed automatically that the introduction of a specific measure has brought it about.

The decline in importance of infectious diseases in Britain, particularly since the beginning of the century, has coincided with an upsurge in the importance of the so-called 'chronic diseases'. The dramatic increase in coronary heart disease and lung cancer must in part reflect an awareness amongst clinicians and pathologists of them as disease entities, so that although they occurred in the past, deaths from them were attributed to other causes.

Nevertheless, the majority of the increase has been 'real' and both diseases are discussed in a later section of this chapter.

### **Describing disease in relation to place**

Description of the pattern of disease in geographical terms (Figure 2.5) can be undertaken in a number of ways, although there are three main aspects:

- (a) international variation (between countries),
- (b) national variation (within a country),
- (c) smaller area variation (e.g. urban/rural).

#### **(a) *International variation***

Many diseases vary in frequency between different countries and on



**Figure 2.5** Describing disease in relation to place: international, national and urban-rural variation

occasions this may give clues to causation. Table 2.1 shows variation in the incidence of cancer of the stomach in men in different countries. Part of this variation will be due to availability of medical services and the extent to which cases of the disease are detected, but undoubtedly some of the geographical variation is real. The relatively high incidence in Japan has long been recognized and has led to speculation about the role of possible dietary practices in that country in the causation of stomach cancer.

A study of differences in the occurrence of an individual disease in different parts of the same continent may sometimes give clues to aetiology. Dennis Burkitt, who for many years was a missionary doctor in Africa, discovered and studied a form of lymphatic cancer amongst

**Table 2.1** Age-standardized\* cancer-incidence rates in males for carcinoma of the stomach from cancer registries in different parts of the world

<i>Place</i>	<i>Rate per 100 000 population</i>
Osaka, Japan	91.4
Sao Paulo, Brazil	49.5
Finland	37.5
Birmingham, UK	23.3
Connecticut, USA	13.5

\*Standardized to rounded off 'world' population

Source: Data extracted from International Agency for Research on Cancer (1976). *Cancer Incidence in Five Continents: Volume III*. (Lyon: International Agency for Research in Cancer)



African children with a high fatality which now bears his name: Burkitt's lymphoma. In a series of field studies of the disease, he ascertained that the disease was much more common in some parts of Africa than others: indeed the highest frequency of the disease appeared to be in a belt across the central portion of the continent (Figure 2.6). This belt coincided with climatic conditions which were characterized by high rainfall and high average temperatures and a high occurrence of malaria. Such a climatic condition pattern coincident with the frequency of the disease is suggestive of some form of infectious aetiology. As a parallel finding a herpes virus, the Epstein-Barr (EB) virus, was isolated from the tissue of children with Burkitt's lymphoma. Thus, evidence of a possible role for a virus in the causation of a human cancer had emerged from the study of the pattern of a disease in relation to place. Although the mechanism is not yet clarified, in particular the inter-relationship of host, virus and environmental factors (e.g. malaria), the potential of the findings is very considerable.



**Figure 2.6** The Burkitt's lymphoma belt where the tumour is endemic. There are tumour-free regions within this area, however, and occasional cases have been reported north and south of it. Source: Burkitt, D. P. (1970). Geographical distribution. In Burkitt, D. P. and Wright, D. H. (eds.) *Burkitt's Lymphoma*. (Edinburgh: Churchill Livingstone)

The example seems much closer to home when it is noted that the same virus has been implicated in the causation of infectious mononucleosis (glandular fever) in the Western world.

**(b) National variation**

For many diseases in the UK, there is variation in morbidity and mortality rates between different geographical areas. Chronic



**Figure 2.7** Standardized mortality ratios (SMRs) for all causes of death in males for English Health Regions, Wales, Scotland and Northern Ireland, 1979. Source: Using data from various; England and Wales 1979 was taken as the standard population

bronchitis, for example, is more common in the urban industrial areas of northern England than in the rural areas of the south. Other diseases are also distributed in a similar way. The overall result is that general mortality within Britain is lower for the population of southern England and East Anglia and higher for parts of northern and north-western England, Wales and Scotland (Figure 2.7). The reason for this is multifactorial and complex, involving amongst other things social class, levels of employment and standard of nutrition. A lower than average per capita expenditure on health services takes place in northern England, but there is a higher than average expenditure in Scotland and Northern Ireland which would tend to suggest that expenditure on health services is not a major contributory cause.

(c) *Small areas*

Data to show patterns of ill-health at a smaller geographical level are depicted in a series of figures and tables contrasting urban and suburban areas of Teesside County Borough in Chapter 1.

**Describing disease in relation to person**

There are many more ways of examining the pattern of disease in relation to the characteristics of people than for either time or place.



**Figure 2.8** Describing disease in relation to person: age, sex, marital status, occupation and ethnic groups

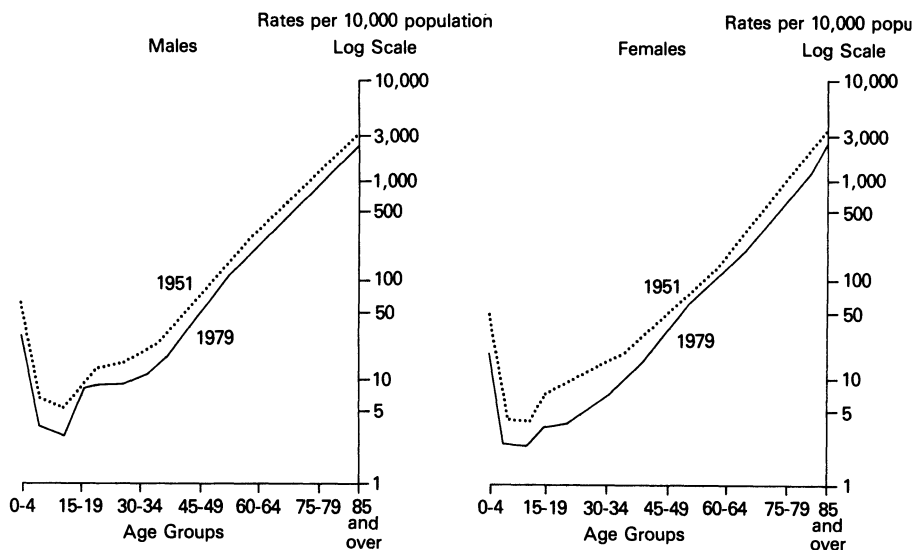
Here examples of some of the more commonly used variables are raised (Figure 2.8). Most diseases show a distinct pattern when looked at in terms of age, sex, occupation and social class. In addition, there are diseases which vary with marital status and amongst people of different ethnic origin.

### *Age and Sex*

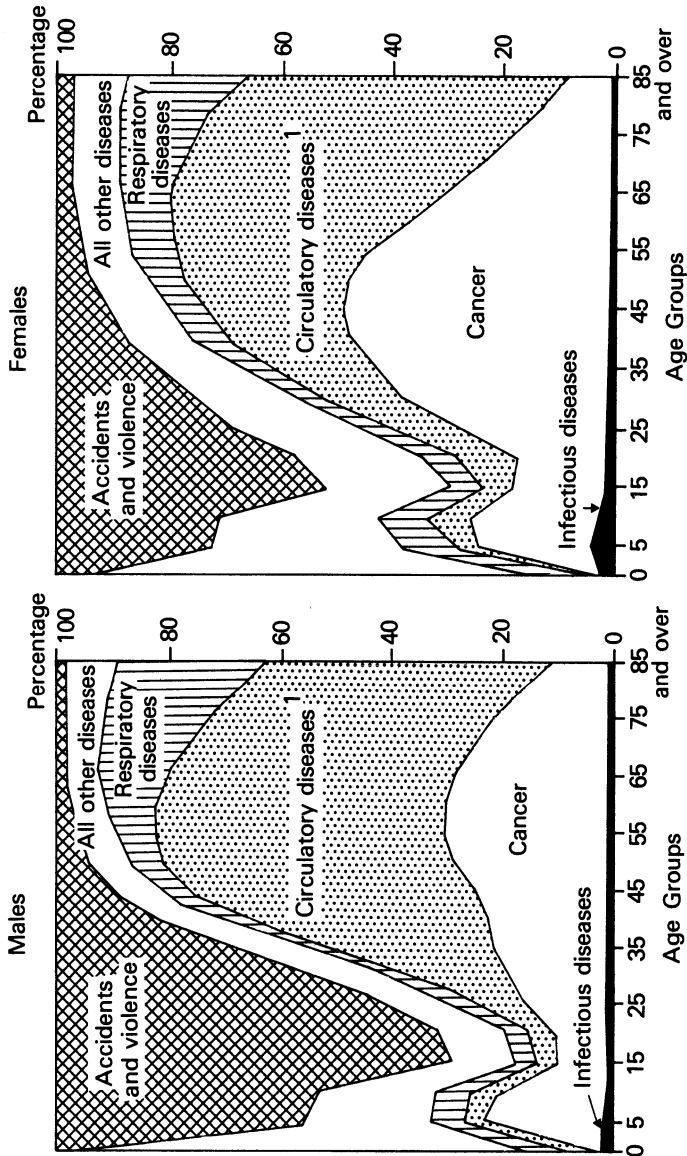
Almost all diseases show marked variation with age. Indeed, mortality rates themselves, from all causes, show a distinctive pattern (Figure 2.9). Once the first few years of life have been passed, there are relatively few deaths per unit population until the age of about 35 years, when death rates begin to increase sharply within each successively higher age group.

There are differences too, in the importance of different causes of death in the various age groups. It can be seen (Figure 2.10) that in the younger age groups, particularly in males, accidents and violence are a more important cause than disease. In the older age groups, the so-called 'chronic degenerative diseases': disease of the circulatory system, cancer, respiratory diseases – begin to dominate.

Deaths from infectious diseases have further declined over the past 30 years at a much greater rate than many other causes of death. In young people, other causes of death such as accidents, violence and

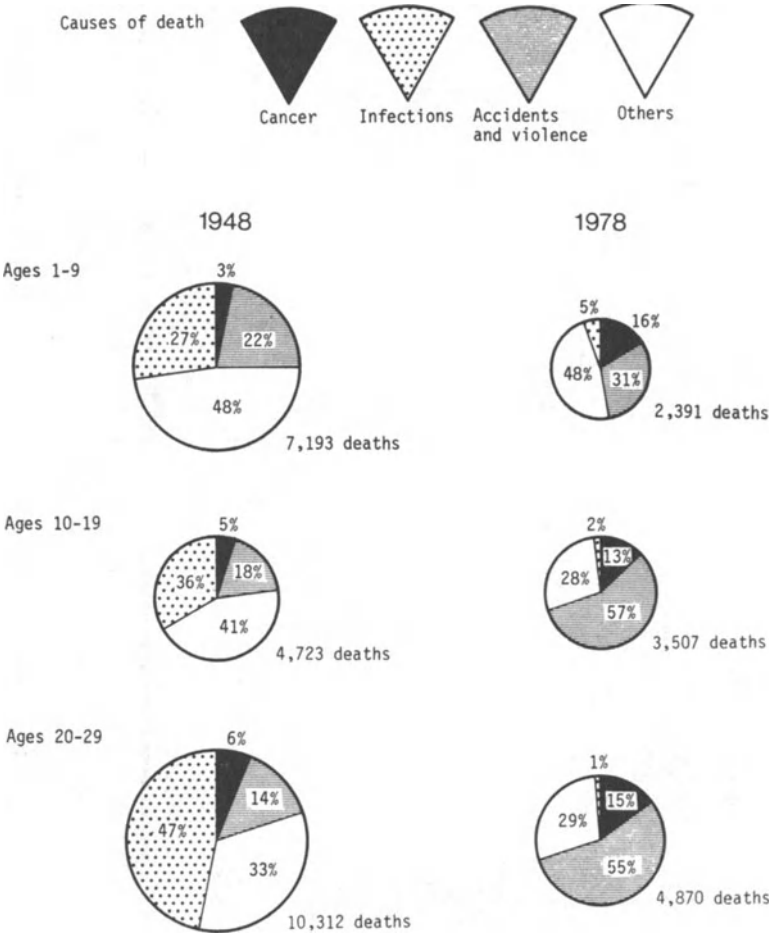


**Figure 2.9** Death rates: by age and sex, United Kingdom, 1951 and 1979. Source: Central Statistical Office (1981). *Social Trends*, No. 12. (London: HMSO)



**Figure 2.10** Selected causes of death: by age and sex, United Kingdom, 1979. Source: Central Statistical Office (1981). *Social Trends*, No. 12. (London: HMSO)

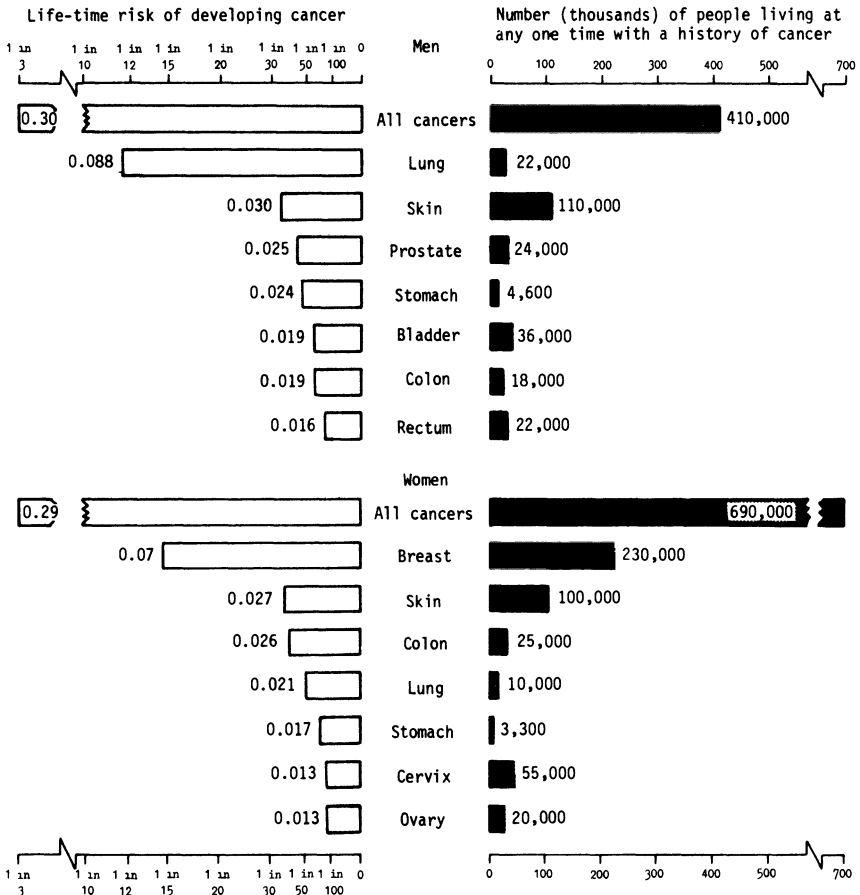
cancer have now asumed greater importance (Figure 2.11). Indeed, cancer is now placed high in the list of causes of death for all age groups, although it is most common in the oldest age groups. One hundred and eighty thousand new cases of cancer and 125 000 deaths



**Figure 2.11** Contribution of different causes to deaths in young people, 1948 and 1978, England and Wales. Source: OPCS (1981). *Report of the Advisory Committee on Cancer Registration: Cancer Registration in the 1980s.* (London: HMSO)

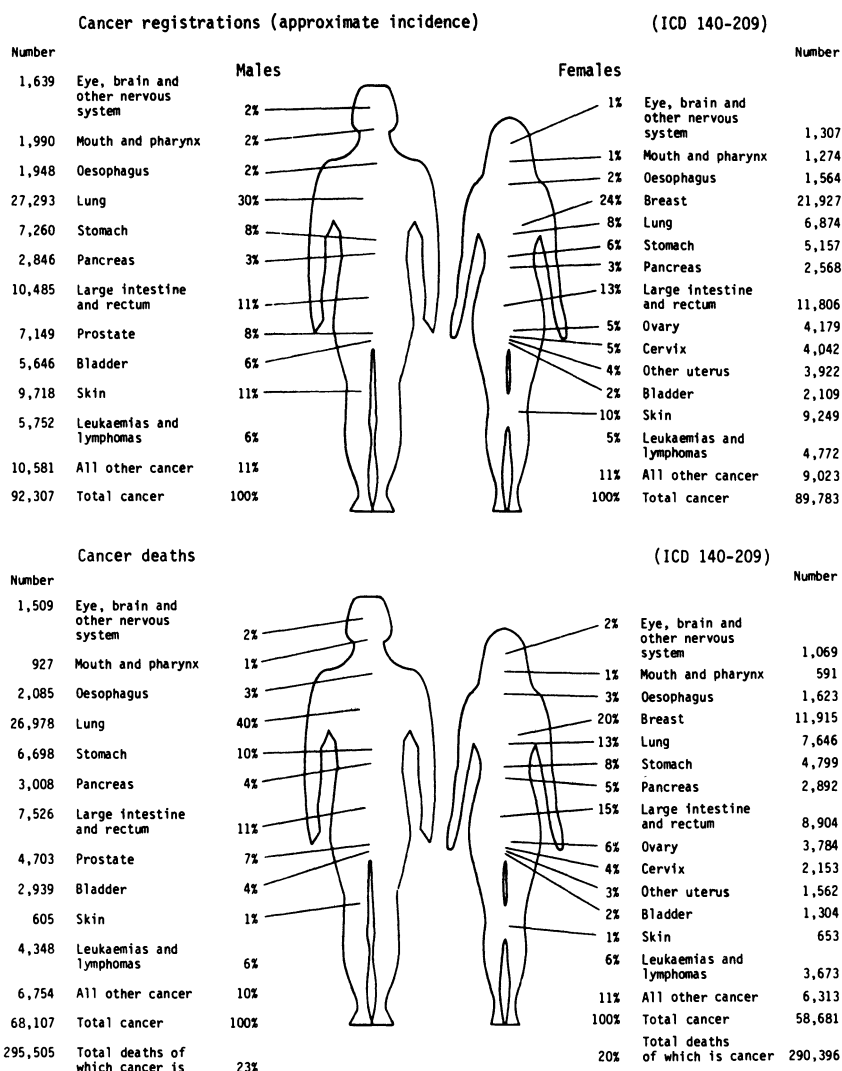
from cancer occur each year in England and Wales. Around one in three people in Great Britain could expect to develop cancer at some time during their lives (Figure 2.12) and one in five will die from it. The commonest sites are lung for males and breast for females (Figure 2.13).

There is a remarkable inequality between the sexes with respect to mortality: male mortality has exceeded female mortality in nearly all age groups since the middle of the last century when certification and



**Figure 2.12** Risks and prevalence of cancer, 1974, England and Wales.  
Source as for Figure 2.11

registration of deaths began (Table 2.2). The exception is in adolescent girls in the middle of the nineteenth century, where a higher mortality from tuberculosis meant that death rates exceeded those of their male counterparts. Despite the decline in both sexes for all ages over time,



**Figure 2.13** Cancer registrations (1974) and deaths (1978) by sex and site, England and Wales. Source as for Figure 2.11



**Table 2.2 Excess mortality as a percentage in males**

<i>Years</i>	<i>Infants (1 yr)</i>	<i>Children (5-9 yrs)</i>	<i>Young adults (20-24 yrs)</i>	<i>Middle age (45-54 yrs)</i>	<i>Early old age (65-74 yrs)</i>
1841-50	22	3	5	14	11
1871-80	22	8	8	29	14
1901-10	23	- 3	19	30	20
1931-40	29	12	17	44	34
1961-70	29	47	124	66	86

Source: Clayton, D.G. (1979). Sex differences in illness: an increasing discrepancy. *Gen. Practitioner*, 23rd March: 18

the ratio of male to female mortality has been increasing: moreover, the greatest discrepancies occur in young adulthood, where road accidents are the most important cause and in middle and later life when ischaemic heart disease and lung cancer appear to have increased as causes of death in males. Infant mortality, which has shown the greatest improvement over time (for both sexes), has shown a fairly stable sex ratio. Another component of the increase in the sex differential in mortality has been the decline in maternal mortality.

The importance of cultural and behavioural factors such as cigarette smoking and automobile use in maintaining this sex differential in mortality is emphasized by the fact that female death rates most often exceed those of males in non-industrialized countries, although here too high rates of maternal mortality may contribute.

The result of differential life expectancy between the sexes has a profound effect on the composition of the population, especially the elderly (Table 8.1, Chapter 8).

**Table 2.3 Death rates per million population for malignant neoplasm of cervix uteri (ICD No. 171) by age and marital status, 1965-1967, England and Wales**

<i>Death rates according to age group (years)</i>								
<i>Marital status</i>	<i>15-24</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65-74</i>	<i>75-84</i>	<i>85 and over</i>
Single	—	10	53	87	94	111	115	164
Married	1	10	92	190	192	218	289	477
Widowed	—	—	193	281	258	296	332	365
Divorced	—	55	207	291	374	416	504	—

Source: Registrar General's Statistical Review of England and Wales (1967). Part III commentary

*Marital status*

Some diseases show variation with marital status. For example, in the case of mortality from cervical cancer, death rates at all ages are higher for widowed and divorced women than married women (see Table 2.3). Such differences can throw up interesting theories about possible causal mechanisms in a disease. In the case of cervical cancer the different rates for women of different marital status are one piece of information. Taken together with another fascinating observation (see Table 2.4) that women with husbands who follow particular occupations, e.g. fishermen, deck and engine room ratings, barge and boat men, have a particularly high risk of death from the disease, this has led to suggestions that the disease may be associated with promiscuity and multiple sexual liaisons. This in turn raises the possibility of a possible infectious agent transmitted venereally.

**Table 2.4 Standardized mortality ratios for cervical cancer by social class and husband's occupation in married women (England and Wales 1959-63)**

<i>Social class</i>	<i>Occupation of husband</i>	<i>SMR</i>
I	All occupations	34
	Clergymen	12
	Scientists	17
	Civil Engineers	60
II	All occupations	64
	Teachers	30
	Senior government officials	40
	Publicans and inn keepers	120
	Lodging house and hotel keepers	150
III	All occupations	100
	Clerks of work	40
	Clerks	64
	Crane and hoist operators	159
	Drivers of road goods vehicles	168
IV	All occupations	116
	Shopkeepers and assistants	71
	Gardeners and groundsmen	98
	Fishermen	257
	Deck and engine room ratings, barge and boat men	263
V	All occupations	181
	Office and window cleaners	95
	Labourers	222

Source: Beral, V. (1974). Cancer of the cervix: a sexually transmitted infection? *Lancet*, 1, 1037-1040

Although there is as yet no firm evidence, this example again shows how a line of enquiry may be started from examining the pattern of a disease within a population.

### *Occupation and social class*

The study of mortality in groups of workers in particular occupations or industries has a long tradition, and through the years this has uncovered particular risk factors for particular diseases which have arisen in the working environment (see also Chapter 3).

The division of society into strata or classes has a history as long as that of Man himself; the rigid hierarchical structure of feudal England is a noteworthy example. In the minds of many people, however, the idea of social class is strongly linked with the name of Karl Marx (1818–1883). In his writings and commentaries on industrial Britain in the middle of the nineteenth century, Marx saw two social classes which were related economically to the means of production: ‘bourgeoisie’ (owners of the means of production) and the ‘proletariat’ (providers of the labour). In between these two polarized groups, he recognized a third group which he called the ‘petit bourgeoisie’ (e.g. lawyers, tradesmen) on whom the owners relied because of their possession of certain essential skills. The German economist Max Weber (1864–1920) formulated an alternative view in which he saw three distinct systems of stratification based on prestige, power and economical factors. Thus he saw society in a hierarchical way, made up of groups of differing social status. Membership of a particular group would not be dependent on economic status alone but reflect a variety of factors and would determine, in general, a person’s values and behaviour.

In 1911, the Registrar General in Britain first used a hierarchical classification of social class based on occupation. The move to collect and present data in this way was prompted by the concern expressed by many of the social reformers of the time such as Charles Booth (1840–1916) and Seebohm Rowntree (1871–1954), about the high rates of mortality amongst the poor, in particular infant mortality. The classification grouped people according to the skill required for, and the social standing carried by, their particular occupation. Although it underwent a major revision in 1921 and has been modified at intervals subsequently, information on occupation as a basis for assigning social class in Great Britain has been collected at census and at registration of birth and deaths since that time.

The idea of using occupation as a basis for social class has often been challenged. Indeed, indices such as education or income have been used by survey workers and held to be a more valid means of achieving social stratification. Nevertheless, because of its simplicity and convenience

and the fact that data stretch back for some considerable time, occupation is likely to remain the basis for the Registrar General's concept of social class.

**Social class.** Information is collected about a person's occupation at birth, marriage or death registration and at the time of the census. This information relates to the person's current or most recent occupation. Children are classified on the basis of their father's occupation. Married women were in the past classified only by their husband's occupation; today, if they are or have been employed, they are classified by their own occupation. It has always been the practice to classify single or divorced women by their own occupation.

Studying data, for instance, on mortality by cause for workers in different occupations or industries can serve as a basis for the determination of risk factors which are mainly occupational in origin.

When occupations are grouped together by the Registrar General into social classes, the aim is to highlight different kinds of influences on morbidity and mortality. The purpose is to indicate groups of people who may follow a similar way of life and this attempts to separate the influence of such life-style factors in the development of ill-health from the direct hazards of the working environment.

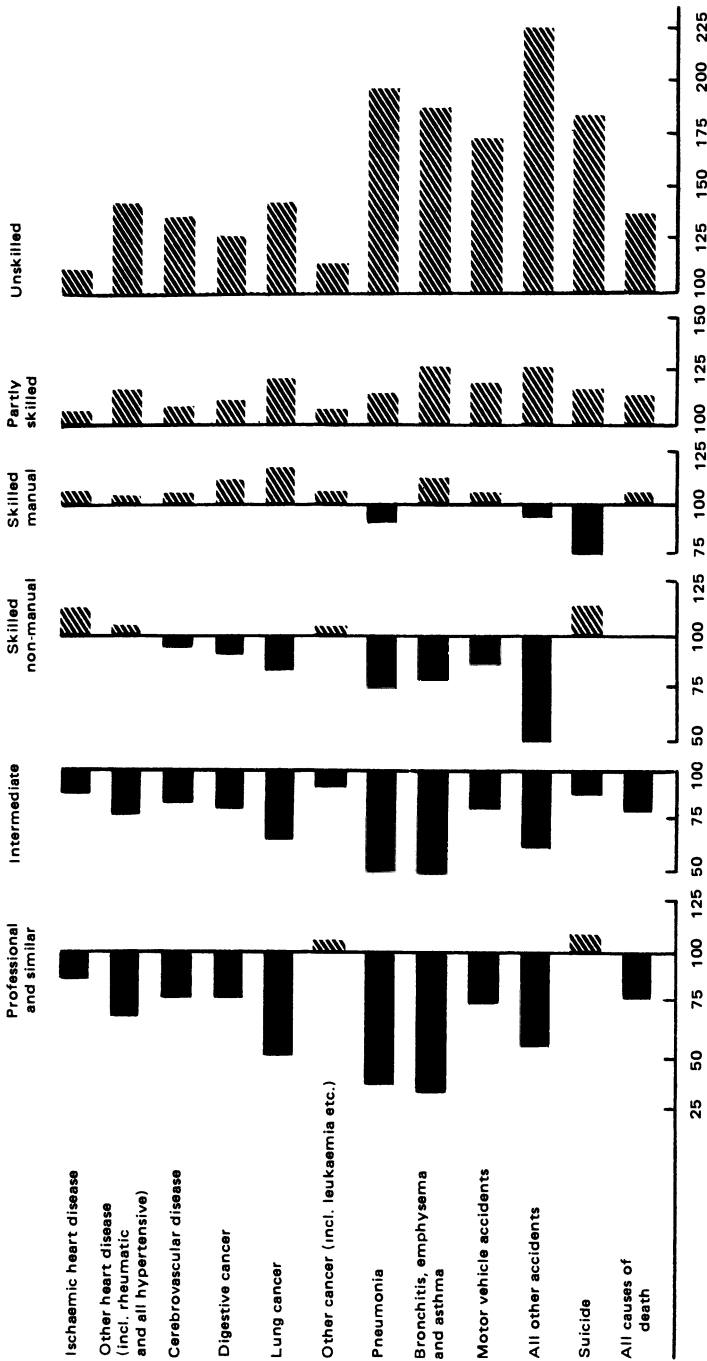
In general each occupational group is given a basic social class, although certain groups (e.g. managers or foremen) are allocated to a higher social class than others in their occupational group on the basis of their level of responsibility.

The present social class categories are as follows:

- I Professional occupations
- II Intermediate occupations
- III N Non-manual skilled occupations
- III M Manual skilled occupations
- IV Partly skilled occupations
- V Unskilled occupations
- VI Other (students, armed forces, and people whose occupation is inadequately described).

There is a striking similarity in the pattern of disease and death within these different social class groups.

Figure 2.14 shows the way in which mortality from the major causes of death for men aged 15–64 years varies with social class. It can be seen that for Social Class I, the professional class, the group experienced more favourable mortality from nearly all causes as reflected in standardized mortality ratios (SMRs) below 100, the exceptions being other cancers (including leukaemia) and suicide, where the SMRs were slightly greater than 100.



**Figure 2.14** Deaths of men: by major cause and social class, 1970-1972, England and Wales. Source: Central Statistical Office (1978). *Social Trends*, No. 9, 1979 Ed. (London: HMSO)

In contrast, amongst men in Social Class V, the unskilled workers, SMRs for all causes were considerably greater than 100, with the SMR for respiratory diseases approaching 200 and that for the 'all other accidents' category exceeding it.

This familiar pattern of increasing mortality on moving down the social-class scale is a feature of all age groups from birth, through childhood into adult life (Table 2.5).

*Socio-economic groups.* This is an alternative way of classifying the population on the basis of employment status and occupation: it was introduced in 1951 and has been extensively amended since then. There are 17 categories, e.g. 'agricultural workers' or 'employers and managers in industry and commerce'. Unlike social class the numbering of the groups is not hierarchical. The groups are sometimes combined into six 'collapsed categories', as used in Table 2.7.

**Table 2.5** Male mortality rates at different ages in occupational classes IV and V as a percentage of those in class I

	<i>Class IV as percent class I</i>	<i>Class V as percent class I</i>
	<i>1970-72</i>	<i>1970-72</i>
Total infant mortality (under 1 year)	162	255
1-4 years	153	212
5-9 years	160	246
10-14 years	141	200
Total 1-14 years	151	219
15-19	148	161
20-24	184	236
25-34	176	297
35-44	163	235
45-54	163	209
55-64	137	157

Source: Department of Health and Social Security (1980). *Inequalities in Health: Report of a Research Working Group (the Black Report)*. (London: DHSS)

## INDIVIDUAL DISEASES

The main features of many of the important infectious or communicable diseases are described in detail in Chapter 9. Individual chronic diseases and other contemporary health problems are described at appropriate points within other chapters of the book: for example, suicide, parasuicide, alcoholism, drug addiction and mental handicap are discussed in Chapter 7 which deals with the Mentally Disordered. Problems such as neural tube defects and child abuse are dealt with in Chapter 6 on Mothers and Children.

In this section, an account is given of several important diseases which represent major health problems in modern Britain: cancer, accidents, ischaemic heart disease and stroke. Aspects of some of these diseases are discussed at other points in the book, where they illustrate general principles. For example, in Chapter 3 lung cancer and coronary heart disease are both discussed in relation to the causation of disease and its prevention. The purpose of including them here is to bring them together and describe their main features in a uniform systematic fashion. Details of each cancer by site are not given, but three common types of cancer are chosen as examples: lung cancer, breast cancer and stomach cancer.

### Lung cancer

#### *Size of the problem*

**Mortality.** In England and Wales in 1980, 71.4 per 100 000 of the population of all ages died from malignant neoplasm of the trachea, bronchus or lung: a total of 35 168 deaths. This represented 9% of all deaths in men and 3% in women.

Cancer of the lung accounts for about 40% (the largest proportion) of all deaths from cancer in men and is the third most common cancer to cause death in women (13%).

**Incidence.** The number of new cases of cancer registered approximates the incidence of the disease but will probably be an underestimate (see Chapter 1). In 1976, in England and Wales, 27 648 male cases of cancer of the bronchus and lung and 7304 female cases were registered. The rates for newly diagnosed cases (per 100 000 population) were 115.8 (men) and 29.1 (women).

#### *Patterns*

Mortality from lung cancer in both sexes increases sharply after the age of 44 years and reaches its maximum value in the 75–84-year age group. Rates are higher for males than females at all ages, but the sex differ-

**Table 2.6 Age-specific death rates (per 100 000 population) from malignant neoplasm of the trachea, bronchus and lung, England and Wales, 1980**

	<i>Death rates according to age group (years)</i>						<i>All ages</i>
	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65-74</i>	<i>75-84</i>	<i>85 and over</i>	
Males	8.2	61.5	242.4	561.3	811.7	664.2	111.7
Females	4.4	24.3	76.2	117.7	123.7	112.8	33.2

Source: Derived from Office of Population Censuses and Surveys (1982). *Mortality Statistics, Cause, England and Wales, 1980*. Series DH2. No. 7. (London: HMSO)

ence increases with age: in the younger age groups mortality rates in males are about two and a half times those for females increasing to about seven times for the oldest age groups (Table 2.6).

Mortality from cancer of the lung is strongly related to social class. The standardized mortality ratio (SMR) (see Chapter 1) in men aged under 64 years increased from 53 in Social Class I to 143 in Social Class V.

There has been an epidemic increase in deaths from cancer of the lung. Between about 1930, when the epidemic first began, to the present day, the annual mortality from this disease increased more than 30-fold.

Within England and Wales geographical variation is illustrated by examining standardized registration ratios, a similar concept to the standardized mortality ratio or SMR. These show that the occurrence of newly diagnosed cases of the disease was higher in metropolitan counties than in predominantly rural areas.

### *Aetiology*

There is now conclusive evidence that cigarette smoking is the major cause of lung cancer: cigarette smokers on average are 10 times more likely to develop the disease than non-smokers. Some of the evidence is discussed in more detail elsewhere (see Chapter 3). Risk is increased with greater number of cigarettes smoked daily, longer duration of smoking and earlier age of starting smoking. Pipe and cigar smokers have increased risk compared to non-smokers, but much lower than that of cigarette smokers.

Certain occupational hazards have also been implicated – in particular asbestos, uranium and nickel, although the risks are low compared to cigarette smoking. However, studies on workers in contact with these compounds who are also cigarette smokers have shown that they act synergistically with cigarette smoke to produce



much higher mortality rates from lung cancer compared to smokers with no such occupational exposure.

The role of atmospheric pollution is not clear cut and it is unlikely to have any independent effect on non-smokers. It may accentuate the risk for smokers but its overall impact is very low compared to cigarette smoking.

### *Scope for prevention*

Lung cancer is a preventable disease: if an individual stops smoking his risk of developing lung cancer decreases over a period of years. Although there is a rapid initial decline, it takes about 15 years for the ex-smoker's risk to reach that of a non-smoker. There is little potential for early diagnosis as a preventive strategy in lung cancer. Cure rates

**Table 2.7 Prevalence of cigarette smoking by sex and socio-economic group, 1972 and 1980, Great Britain**

<i>Socio-economic group</i>	<i>% smoking cigarettes</i>		<i>% change</i>
	<i>1972</i>	<i>1980</i>	<i>1972-1980</i>
<i>Men</i>			
1 Professional	33	21	- 12
2 Employers and managers	44	35	- 9
3 Intermediate and junior non-manual	45	35	- 10
4 Skilled manual and own account non-professional	57	48	- 9
5 Semi-skilled manual and personal service	57	49	- 8
6 Unskilled manual	64	57	- 7
All men	52	42	- 10
<i>Women</i>			
1	33	21	- 12
2	38	33	- 5
3	38	34	- 4
4	47	43	- 4
5	42	39	- 3
6	42	41	- 1
All women	42	37	- 7

Source: Derived from Office of Population Censuses and Surveys (1981). *General Household Survey*. (London: HMSO)

have improved little over recent years: only about a third of patients survive one year from diagnosis.

To say that an effective preventive option is available is not to minimize the potential difficulties in effecting a change in behaviour in the smoking population. Changes in smoking behaviour have taken place in Great Britain over recent years, presumably as a result of growing awareness on the part of the public of the dangers of cigarette smoking. The cessation of smoking, however, has been greater in some groups than others. In both sexes, changes have been better in the professional groups than in the semi-skilled and unskilled manual workers. Overall, the decline has been greater in men than in women (Table 2.7).

The measures which have been advocated or adopted to reduce the consumption of cigarettes are diverse and have had differing levels of success. There is no single solution to the problem and the strategies will involve measures directed at the individual (by direct contact or advertising) in the form of health education or behaviour modification, as well as legislative and social policy initiatives. The

**Table 2.8 Range of preventive strategies to combat cigarette smoking**

- 
1. Legislation rapidly to phase out all advertising of tobacco and sales promotion of tobacco products (except at place of purchase)
  2. Sponsorship of sporting and artistic activities by tobacco companies should be banned over a period of a few years, and there should be stricter control of advertisement through sponsorship
  3. Regular annual increases in duty on cigarettes in line with rises in income should be imposed, to ensure lower consumption
  4. Tobacco companies should be required, in consultation with the Trades Unions, to submit plans for the diversification of their products over a period of 10 years with a view to the eventual phasing out of sales of harmful products at home and abroad
  5. The provision of non-smoking areas in public places should steadily be extended
  6. A counselling service should be made available to all health districts, and experiments in methods to help people reduce smoking should be encouraged
  7. A stronger, well-presented health warning should appear on all cigarette packets and such advertisements as remain, together with information on the harmful constituents of cigarettes
- 

Source: Department of Health and Social Security (1980). *Inequalities in Health: Report of a Research Working Group (the Black Report)*. (London: DHSS)

breadth of approach which might be needed is illustrated in the recommendations of the recent working party on Inequalities in Health, shown in Table 2.8.

## Breast Cancer

### *Size of the problem*

**Mortality.** In England and Wales in 1980, 48.2 per 100 000 women of all ages died from breast cancer. This represented a total of 12 167 deaths in that year. The disease does occur in men, but is very rare, accounting for only 78 deaths in England and Wales in 1980. In women, breast is the commonest cancer causing death (accounting for 20% of all cancer deaths) and contributes 4% to deaths from all causes.

**Incidence.** The number of new cases of female breast cancer registered in England and Wales in 1976 was 83.5 per 100 000, a total of nearly 21 000, making breast the leading site: approximately 24% of all new cancer registrations in women.

### *Patterns*

Death rates and registration rates for female breast cancer increase with age, the highest rate occurring in the oldest age group (Table 2.9).

Mortality rates from the disease had been fairly stable over several decades, but there appears to have been some increase over the last ten years. There are geographical variations in the disease: its frequency is

**Table 2.9** Age-specific death\* and new cancer registration† rates (per 100 000 population) from malignant neoplasm of the female breast, England and Wales

	<i>Age group (years)</i>							<i>All ages</i>
	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65-74</i>	<i>75-84</i>	<i>85+</i>	
<b>Mortality rate</b>	3.9	23.4	67.3	97.8	122.2	164.8	255.7	48.2
<b>Registration rate</b>	13.6	71.0	142.3	169.4	197.7	249.2‡		83.5

\*1980, †1976, ‡75 and over

Source: Data extracted from Office of Population Censuses and Surveys (1982). *Mortality Statistics, Cause. England and Wales, 1980*. Series DH2, No. 7. (London: HMSO)

**Table 2.10 Standardized mortality ratios (SMRs) for cancer of the female breast for English health regions and Wales, 1979**

<i>Region</i>	<i>SMR</i>
S.E. Thames	112
West Midlands	107
East Anglian	106
Oxford	103
N.E. Thames	103
South Western	101
Wessex	101
S.W. Thames	100
Trent	99
Yorkshire	97
North Western	94
N.W. Thames	93
Mersey	91
Northern	89
Wales	99
England and Wales	100

Source: Office of Population Censuses and Surveys (1982). *Mortality Statistics England and Wales, 1980*, Series DH1, No. 8. (London: HMSO)

relatively high in Great Britain and some other European countries (e.g. Holland and Denmark) and low amongst Japanese women. Within England and Wales there are regional variations, with relatively high mortality being observed in the South East Thames, West Midlands and East Anglian Regions (see Table 2.10).

### *Aetiology*

As with many diseases where the cause has not been clearly elucidated, it is necessary to weigh up the factors which have been implicated in a wide variety of different studies. Table 2.11 provides a summary of current evidence regarding the many risk factors which have been implicated by research workers in the causation of breast cancer.

### *Scope for prevention*

In the absence of individual risk factors on which to base a strategy of 'primary' prevention (i.e. preventing the disease from occurring in the first place), the main issue in the prevention of this disease relates to presymptomatic screening. As is discussed more fully in Chapter 3, identifying individuals in the early or presymptomatic phase of disease

**Table 2.11 Risk factors for breast cancer in females**

<i>Factor</i>	<i>High risk</i>	<i>Low risk</i>	<i>Magnitude of risk differential*</i>
Age	Old age	Young age	>>>
Country of residence	North America, northern Europe	Asia, Africa	>>>
Socio-economic class	Upper	Lower	>>
Marital status	Never married	Ever married	>
Place of residence	Urban	Rural	>
Place of residence	Northern US	Southern US	>
Race	White	Black	>
Age at first birth	Older than 30	Younger than 20	>>
Oophorectomy	No	Yes	>>
Body build	Obese	Thin	>>
Age at menarche	Early	Late	>
Age at menopause	Late	Early	>
Family history of premenopausal bilateral breast cancer	Yes	No	>>>
History of cancer in one breast	Yes	No	>>>
History of fibrocystic disease	Yes	No	>>
Any first degree relative with breast cancer	Yes	No	>>
History of primary cancer in ovary or endometrium	Yes	No	>>
Radiation to chest	Large doses	Minimal exposure	>>

\*>>>Denotes relative risk of greater than 4.0. >>Denotes relative risk of 2.0–4.0. >Denotes relative risk of 1.1–1.9.

Source: Kelsey, J. L. (1979). A review of the epidemiology of human breast cancer. *Epidemiol. Rev.* 1, 74–109

Relative risk is the *ratio* of incidence of the disease in a group affected by the factor under study to the incidence of the disease in a group not affected by the factor under study. A relative risk of 1.0 suggests that the factor under study does not influence the incidence of disease. A relative risk greater than 1.0 suggests that the factor under study is associated with an increased incidence of the disease, although this association may not be causal

(‘screening’) is one of the main strategies of preventive medicine. However, if apparently asymptomatic members of the population are to be offered a test to detect a disease in its presymptomatic phase, then they must benefit from this early detection. It may seem obvious that

they would, but early detection (and hence early treatment) does not necessarily equate with improved prognosis.

In many diseases for which screening is advocated there is no clear-cut evidence to suggest that it is of benefit. The major study on the effectiveness of screening of apparently healthy women on mortality from breast cancer was a randomized controlled trial of women enrolled in the Health Insurance Plan of New York<sup>1</sup>. Two groups of 31 000 women were assigned either to annual screening (in the form of breast palpation and X-ray mammography) or to routine medical care with no such annual screening. Follow-up over a number of years showed a lower mortality from breast cancer in the screened group, but only amongst older women (those aged 50 years or over). There was no apparent benefit in terms of mortality from screening of younger women.

The arguments for and against screening healthy women for breast cancer are further complicated by the fact that X-ray radiation even in relatively low doses may occasionally induce the disease. However, rapid technological advances are leading to X-ray mammographic methods which deploy very small doses of radiation. The question of presymptomatic screening for breast cancer and the possible methods is currently the subject of intensive research and discussion. It is too early to say whether its use on a population scale (at least for younger women) can be justified.

## **Stomach Cancer**

### *Size of the problem*

**Mortality.** In men of all ages in England and Wales in 1980, 26.7 per 100 000 died of stomach cancer; the corresponding mortality rate for women was 17.8 per 100 000. The absolute number of deaths attributed to the disease in the same year for the two sexes was 6 403 (men) and 4 497 (women). It was the third most common cancer to cause death in men and the fourth most common in women.

**Incidence.** Survival rates for the disease even after treatment are still very poor and thus mortality rates are a rough approximation of incidence, at least in age groups other than the elderly. Cancer registration data for England and Wales in 1977 show that there were 30.7 and 20.2 newly diagnosed cases of stomach cancer per 100 000 population of males and females respectively.

### *Patterns*

Mortality from the disease increases with advancing years, with rates

**Table 2.12** Death rates (per 100 000 population) for stomach cancer by age and sex, England and Wales, 1980

	<i>Age group (years)</i>						<i>All ages</i>
	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65-74</i>	<i>75-84</i>	<i>85 and over</i>	
Males	2.9	13.4	48.9	131.8	215.1	264.5	26.7
Females	1.7	5.6	18.2	50.6	110.2	196.7	17.8

Source: Derived from Office of Population Censuses and Surveys (1982). *Mortality Statistics, Cause, Series DH2. No. 7.* (London: HMSO)

for males being about twice those for females at all ages (see Table 2.12).

There is a marked gradient with social class in mortality from stomach cancer: the death rate is about three times higher for men in Social Class V than for men in Social Class I, and this holds true for each age group. It has long been known that the disease is more

**Table 2.13** International changes since 1950 in death certification rates for cancers of stomach and lung

<i>Country</i>	<i>Period</i>	<i>Percentage change in mortality* from cancer of:</i>	
		<i>Stomach</i>	<i>Lung</i>
Australia	1950-51 to 1975	-53	+146
Austria	1952-53 to 1976	-53	-8
Chile	1950-51 to 1975	-56	+38
Denmark	1952-53 to 1976	-62	+87
England and Wales	1950-51 to 1975	-49	+33
West Germany	1952-53 to 1975	-50	+36
Ireland	1950-51 to 1975	-54	+177
Israel	1950-51 to 1975	-49	+58
Japan	1950-51 to 1976	-37	+408
The Netherlands	1950-51 to 1976	-60	+89
New Zealand	1950-51 to 1975	-54	+137
Norway	1952-53 to 1975	-59	+118
Scotland	1950-51 to 1975	-46	+44
Switzerland	1952-53 to 1976	-64	+72
United States	1950-51 to 1975	-61	+148

\*Average of male and female rates at ages 35-64y, standardized for age.

Source: Doll, R. and Peto, R. (1981). The causes of cancer: quantitative estimates of the avoidable risks of cancer in the United States today. *J. Natl. Cancer Inst.*, 66, 1191-1308

common in people with blood group A, but the reason for this is not known. Similarly, people with pernicious anaemia are at greater risk of developing stomach cancer. The widely quoted increased risk of patients with 'benign' gastric ulcer developing stomach cancer may not be true.

Mortality from stomach cancer over the last 25 years has shown a marked fall in many industrialized nations, as can be seen in Table 2.13 where this decline is set aside the corresponding increase over the same time-period in mortality from lung cancer. This fall in mortality is mirrored by a similar decline in the registration of the disease, and as it also seems that prognosis has improved little, it seems fair to assume that there has been a true decline in the incidence of the disease.

Stomach cancer is one of the malignant diseases with pronounced international variation and this has stimulated speculation about its cause. The very high occurrence of the disease in Japan, for example, has led to examination of the dietary and culinary practices there. Other countries with a high incidence of the disease are Iceland and parts of South America (particularly Chile).

Within Britain, there are also regions such as Wales and smaller areas such as Stoke-on-Trent, where the disease appears to occur much more commonly.

### *Aetiology*

A number of environmental and dietary risk factors have been postulated as causes of stomach cancer, including for example, smoked food and certain trace elements in the soil. Firm evidence implicating them is so far lacking.

Over recent years a great deal of research attention has focussed on a group of substances called the nitrosamines. These substances are strongly carcinogenic in laboratory animals and on this basis a role for them in the production of human, particularly gastric, cancer has been suggested.

Nitrosamines are formed in the body by the reaction of nitrites and secondary amines in the digestive tract, a reaction which is inhibited by the presence of vitamin C. Nitrite is commonly added to food as a preservative to prevent hazards such as botulism. Nitrite may also be formed by nitrates ingested in vegetables, or in the water supply of certain areas. Secondary amines also occur in certain foods and in some pesticides.

Despite these observations, evidence for a role of these substances in the production of gastric cancer remains circumstantial and must remain unproven.

### *Scope for prevention*

In the absence of clearly defined aetiological factors, there is no



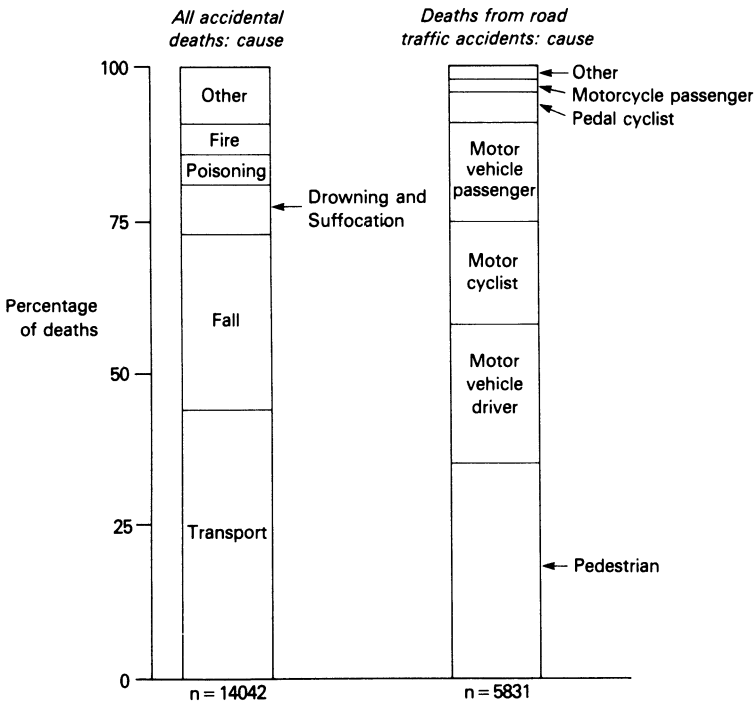
potential for primary prevention in this disease. Whilst good clinical practice dictates early diagnosis and treatment of symptomatic patients, there is no basis at present for screening of apparently healthy individuals to detect the disease.

## Accidents

### Size of the problem

**Mortality.** In England and Wales in 1980, there were 14 042 accidental deaths excluding deaths from self-inflicted injury and homicide. This represented a mortality rate from these causes of 28.5 per 100 000 population and made it the fifth leading cause of death.

Most often these deaths were as a result of transport accidents,



**Figure 2.15** Accidental deaths in England and Wales, 1980, to show causes: all accidents and road traffic accidents. Source: Data extracted from Office of Population Censuses and Surveys (1982). *Mortality Statistics, England and Wales, 1980: Accidents and Violence*, Series DH4, No. 7. (London: HMSO)

Table 2.14 Accidents at work in Great Britain in 1980

	Type of industry				
	Manufacturing	Construction	Railways	Coal-mining	Agriculture
<i>All accidents</i>					
Number	133 164	29 492	4 391	36 758	4 248
Rate per 100 000 at risk	2900	3000	2400	15 200	1400
<i>Fatal accidents</i>					
Number	125	128	30	42	24
Rate per 100 000 at risk	3	13	14	17	8

Source: Derived from Central Statistical Office (1981). *Social Trends*, Vol. 12. (London: HMSO) (Data from Health and Safety Executive)

mainly motor-vehicle traffic accidents, with accidental falls the next most common cause (see Figure 2.15). The majority of road accidental deaths were in pedestrians, with car drivers and occupants forming the other major group.

In England and Wales in 1980 5270 deaths resulted from accidents in the home or in institutions. Fatalities from home accidents accounted for about 38% of all accidental deaths.

Occupational accidents are another important group of accidental deaths. Data on them are collected from a variety of sources concerned with relevant legislation about work and work places. Table 2.14 shows accidents at work in certain industries in Great Britain in 1980, and illustrates how the rate of all accidents is particularly high in the coal-mining industry, although it has fallen considerably since 1970.

*Injuries.* Data on accidents which do not result in death are much more difficult to obtain and indeed any official source will grossly underestimate the problem since many victims will not come to medical attention. Data on road accidents are available from information obtained by the police and presented in reports of the Department of Transport and in analyses of data from various sources presented by the Royal Society for the Prevention of Accidents (ROSPA).

Table 2.15 shows such data for all road users (cyclists, vehicle users and pedestrians) and depicts the severity of injury sustained by a total of 324 840 such casualties in Great Britain in 1981.

Home accidents have not been subjected to the same scientific scrutiny as transport accidents and hence even imprecise estimates of the size of the problem of non-fatal events have been almost impossible to obtain. However, in 1976, a Home Accident Surveillance System (HASS) was established by the Consumers' Safety Unit within the Department of Trade. The operation is tiny in comparison with the research work undertaken on road accidents and the resources available at the Health and Safety Commission in the industrial field.

**Table 2.15 Casualties in all classes of road users in Great Britain in 1981, showing severity of injury**

<i>Severity of injury</i>	<i>No. of people</i>	<i>Percentage of people</i>
Slightly injured	240 735	74
Seriously injured	78 259	24
Killed	5846	2
All casualties	324 840	100

Source: Department of Transport (1982). *Road Accidents and Casualties in Great Britain, 1981*, Statistical Bulletin STCG4 (82) 1. (London: HMSO)

HASS has as its objectives to provide reliable, comprehensive and nationally representative information, to investigate new trends and to identify new hazards, and to evaluate the effectiveness of preventive action. Data are collected from accident and emergency departments of a sample of 20 hospitals in England and Wales. It is a 'rolling' sample in which ten hospitals are replaced each year by others. The data collected include age and sex of the patient, a brief description of how the accident occurred, the products or features of the home involved, the type of injury and where in the house or garden it occurred. In 1980, 76 000 cases were included, but this information, whilst valuable, does not give any impression of the true frequency of the problem of home accidents.

### *Patterns*

Mortality rates in England and Wales in 1980 for motor-vehicle traffic accidents in males exceeded those for females at all age groups. In males, two peaks occurred: in the 15–24-year-old age group the age-specific mortality rate was 38.5 per 100 000 population and in the over 75s, where the figure was slightly greater. In females, no such peak occurred in the younger age groups and the highest age-specific mortality rate in this group of accidental deaths was amongst elderly women: 22.9 deaths per 100 000 women occurred in the over 85s compared with 8.5 per 100 000 women aged 15–24 years.

In males, considering absolute numbers of motor-vehicle traffic deaths rather than rates, 1499 (37%) of all 4027 such deaths were in men aged 15–24 years in England and Wales in 1980. In this same age group, 702 deaths (47% of the total for the age group) were motor cyclists.

For pedestrian deaths, the highest age-specific mortality rates were again seen in the elderly age groups, although rates in childhood were higher than for young adults. Children in the 5–9-year-old age group are particularly at risk as pedestrians, whilst those aged 10–14 years are at additional increased risk as pedal cyclists.

Three-quarters of all road accidents occur in built-up areas, a third occur at night and just over a third on road surfaces which are wet or where there is snow or ice. Accidents on motorways represent 1.6% of all road accidents.

Britain compares relatively favourably with other Western countries in the rate of casualties and deaths in road accidents. Trends over time show that the rate of injury and death on the road have not increased to the same extent as total vehicle volume. This is mainly explained by the fact that in the earlier years neither vehicle nor road design was greatly concerned with safety.

Mortality rates for accidents in the home and residential institutions

**Table 2.16 Age and sex-specific mortality rates per 100 000 population for accidents in the home and residential institutions, England and Wales, 1980**

	<i>Age groups (years)</i>							
	<i>Under 1</i>	<i>1-4</i>	<i>5-14</i>	<i>15-44</i>	<i>45-64</i>	<i>65-74</i>	<i>75 and over</i>	<i>All ages</i>
Male	18.6	6.7	1.3	4.3	8.0	16.8	78.0	8.8
Female	16.4	4.4	0.8	1.9	5.8	18.3	106.7	12.5

Source: Derived from Office of Population, Censuses and Surveys (1982). *Mortality Statistics: Accidents and Violence*. Series DH4, No. 7. (London: HMSO)

show a different age and sex pattern to road accidents. Although male mortality rates exceeded those for females in the younger age groups, the reverse was true for the elderly (see Table 2.16). Table 2.16 also shows that whilst age-specific rates were highest in the elderly, there was an early peak in infancy.

### *Aetiology*

Many of the risk factors in different types of accident have already been discussed in describing the pattern of accidents and accidental deaths. Particular categories of road users (e.g. pedestrians, motor cyclists, pedal cyclists, car drivers) have differing risks of dying or being injured in an accident. Age is a powerful influence in determining the risk of accidents in a number of ways. Firstly, it influences the degree and nature of exposure to particular hazards. Secondly, it is related to skills, competence and attitudes in particular activities. The young child and the elderly person, for example, for very different reasons are at greater risks as pedestrians and fall more often. Young children are still developing physically, mentally and socially and are unaware of dangers such as speeds or distance, and their attention easily wanders. The elderly person may have limited mobility and failing vision or eyesight. Thirdly, age may influence the ability of a person to withstand injuries sustained in an accident.

The single most important aetiological factor in road accidents is alcohol. It is present in about 40% of fatal accidents involving car users and about 20% of those involving pedestrians. Controlled studies which have compared alcohol levels in both drivers and pedestrians involved in accidents with those at a similar time of day and locality in people who are not involved in accidents have strongly indicated a causal association for alcohol. Well before outward signs of intoxication, and even with small amounts of alcohol, impaired reactions may result, but this varies greatly amongst individuals.

The HASS has shown that over 30% of home accidents occur in the

kitchen/dining room area and 9% on stairs. About 15% of accidents occur in the garden/yard and pathways. Steps/stairs are the feature in the home most frequently involved in accidents (9000). Doors to rooms are the second most frequent feature to cause accidents (4000). Accidents at home involving another person account for 4000 accidents. However, a very large list of products and articles and design features of the home are involved in home accidents.

### *Scope for prevention*

In considering accidents as a population health problem, there is probably greater scope for prevention than in most other areas. This is not to minimize the difficulties in establishing an effective programme. A wide variety of techniques have been deployed, including engineering (e.g. road construction), manufacturing processes (e.g. childproof medicine containers), education (e.g. road safety instruction). Similarly, the means of implementing strategies are varied and include legislative measures, social policy initiatives, as well as health education and direct persuasion.

This diversity of approaches is apparent in the activity to prevent road accidents. Research and implementation of findings in the field of engineering and the environment has led to restructuring and marking of dangerous road junctions, bends and hills to improve visibility and remove ambiguity of perception. Attention has also been directed to improving road surfaces, the introduction of crash barriers, installation of lighting to attempt to reduce the risks. Similarly, initiatives in safety have been taken in the design and manufacture of cars; for example, the shock absorbing steering column and reinforcement of body shells. Education of children and parents in restricting the areas of mobility of young children, teaching them road safety procedures such as the 'Green Cross Code' and imparting knowledge about the dangers are an attempt to reduce accidents to children in traffic. Legislative measures have included the compulsory wearing of crash helmets amongst motor cyclists and seat-belts in cars.

An outstanding and seemingly intractable problem in this sphere is still alcohol. The Road Safety Act 1967 laid down that it was an offence to drive with more than the prescribed limit of alcohol in the blood. The introduction of the roadside breathalyser test and its use by the police initially received widespread media attention and has done so periodically since then. The limit was 80 mg of alcohol per 100 ml and it has remained at this level. There is little doubt that the Act initially had a major impact on fatalities and injuries on the road, but the evidence now is that it no longer has any major deterrent effect. There is no general agreement on whether further legislative measures along these lines are desirable, or indeed would be any more effective. Some other

countries have lower limits than those prescribed in Britain, e.g. in Sweden, Norway and Finland the legal limit is 50mg of alcohol per 100ml and in some other countries no alcohol is permitted in drivers. The main argument against reducing the legal limit in Britain is that it is unlikely to deter the many people who regularly exceed the existing limit. Periodically there are calls for stricter penalties, but again there is doubt about whether these would have the required impact. Aside from the law, the main preventive strategy continues to be health education, largely through the mass media. The problem of alcohol in pedestrian accidents is often overlooked, though it is undoubtedly important. It is difficult to envisage any acceptable legislative measure similar to the breathalyser being used in pedestrians, though existing legal provision for dealing with drunk and disorderliness has little impact on this problem.

A similar multidisciplinary approach is in use to prevent non-transport accidents. For example, in combating home accidents, improvements in the design of buildings and products reduce the chance of accidents. This may be backed up by legislation or by voluntary codes of practice agreed with manufacturers. Recent public awareness of these hazards has helped to encourage action to prevent the sale of such things as dangerous toys and to introduce the childproof medicine container. More remains to be done, e.g., in 1982 non-safety glass is widely used in homes, often in inside doors at a low level and has been responsible for some serious accidents in children. Education also has an important part to play in preventing home accidents by making people aware of the dangers. Awareness of design faults in the home, and of the importance of adequate supervision of young children and instruction of older ones in potential hazards should be encouraged. There is a body of opinion which, whilst in no way wishing to abandon health education, feels that the implementation of effective designs is a much more effective measure. To support this they point to a number of studies which have shown disappointing results following intensive health education campaigns. One example cited is that many of the scalds from electric kettles result from a young child pulling the electric flex. This would be largely overcome by the use of a stretch flex like the telephone. The harassed mother thus has one less hazard to watch.

Similar initiatives in places of work and recreation are also of great importance in reducing the risk of accident.

### **Ischaemic heart disease**

#### *Size of the problem*

Ischaemic heart disease (coronary heart disease) has several clinical

manifestations: electrocardiographic changes with no symptoms, angina pectoris, heart failure, rhythm abnormalities, myocardial infarction and sudden death.

*Mortality.* In England and Wales in 1980, 89 659 deaths in men and 64 712 deaths in women were attributed to ischaemic heart disease. The disease accounted for 30% of deaths of all ages in males. The corresponding figure for females was 22%. The majority of these deaths (63 953, men; 43 170, women) were attributed to acute myocardial infarction alone.

The mortality rate from acute myocardial infarction in England and Wales in the same time period was 266.6 per 100 000 men of all ages and 170.9 per 100 000 women of all ages.

*Incidence.* There is no routine source of data to allow the occurrence of new cases of coronary heart disease to be monitored in the way that (for example) an efficient cancer registration system can give an approximation of the incidence of a particular malignant disease in any year. Hospital inpatient data complement mortality data in that they indicate that coronary heart disease is an important cause of morbidity as well as death. During 1978 in England and Wales, for example, nearly 90 000 people were hospital inpatients with a diagnosis of acute myocardial infarction and they were responsible for occupying an average of more than 3500 beds each day. As has been discussed earlier, such data cannot be used as an absolute measure of the frequency of a disease: in coronary heart disease only about half of those suffering an acute attack are treated in hospital.

Thus, whilst these data sources provide valuable information they do not give a measure of true frequency of the disease in the community: such an estimate is provided by community registers of ischaemic heart disease which have been established in various parts of the world. An international research study<sup>2</sup> established registers for acute myocardial infarction in 19 communities, including, in England, Tower Hamlets in London. The annual incidence rate (per 1000 population aged 20–64 years) of acute myocardial infarction (first attack) was 3.2 (men) and 1.0 (women).

### *Patterns*

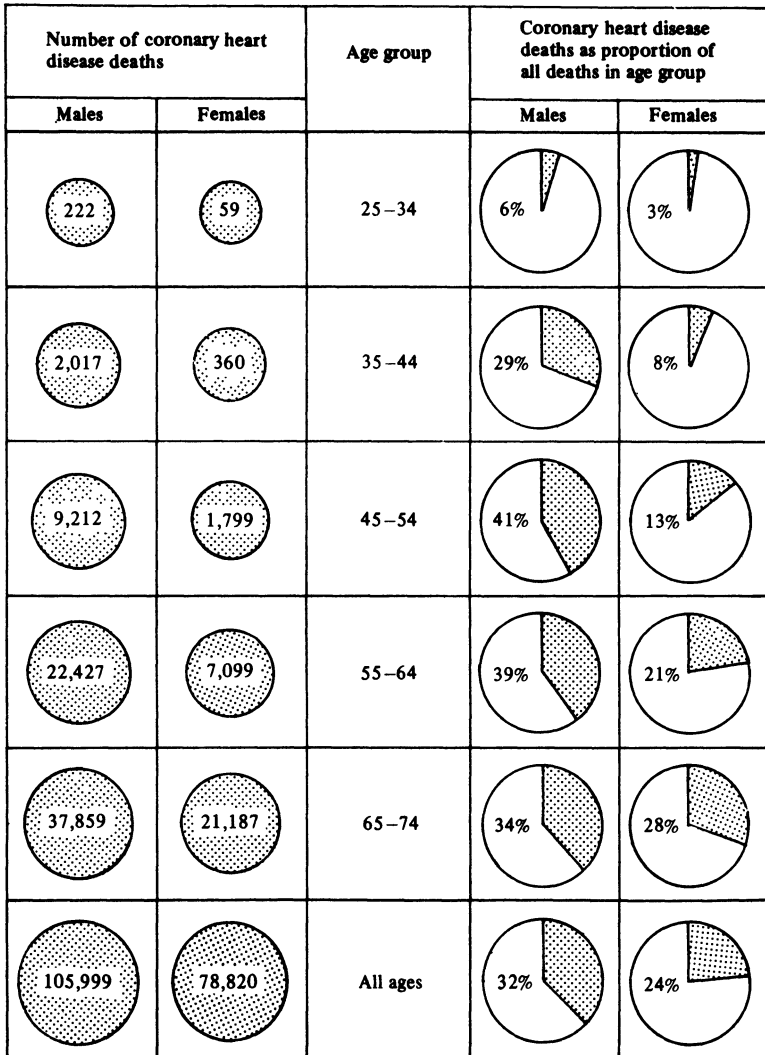
The sex and age differences in coronary heart disease are shown in Figure 2.16 and emphasize the overwhelming importance of the disease as a cause of death in middle-aged men. The difference between the sexes lessens in the older age group, as the disease becomes a more important cause of death in older women.

There is a social-class gradient in mortality from coronary heart

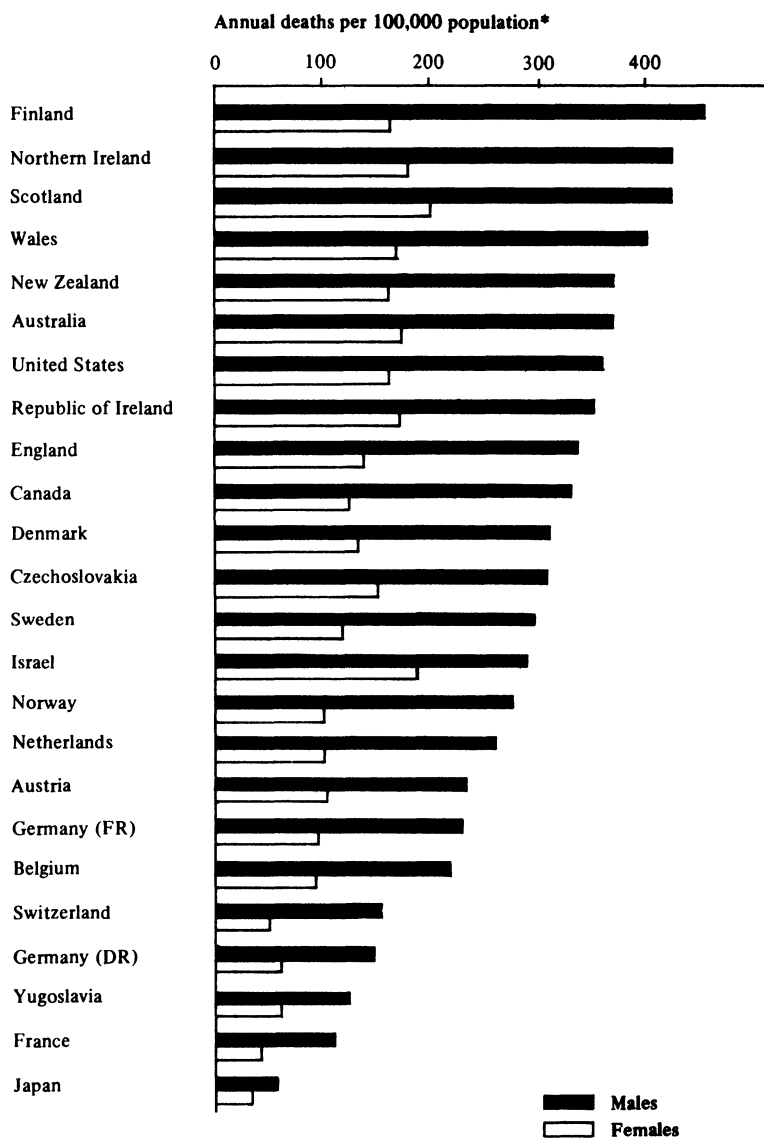


disease, with higher mortality being observed in the lower social class groups, but this gradient is less marked in the older age groups.

There are marked international variations in the frequency of

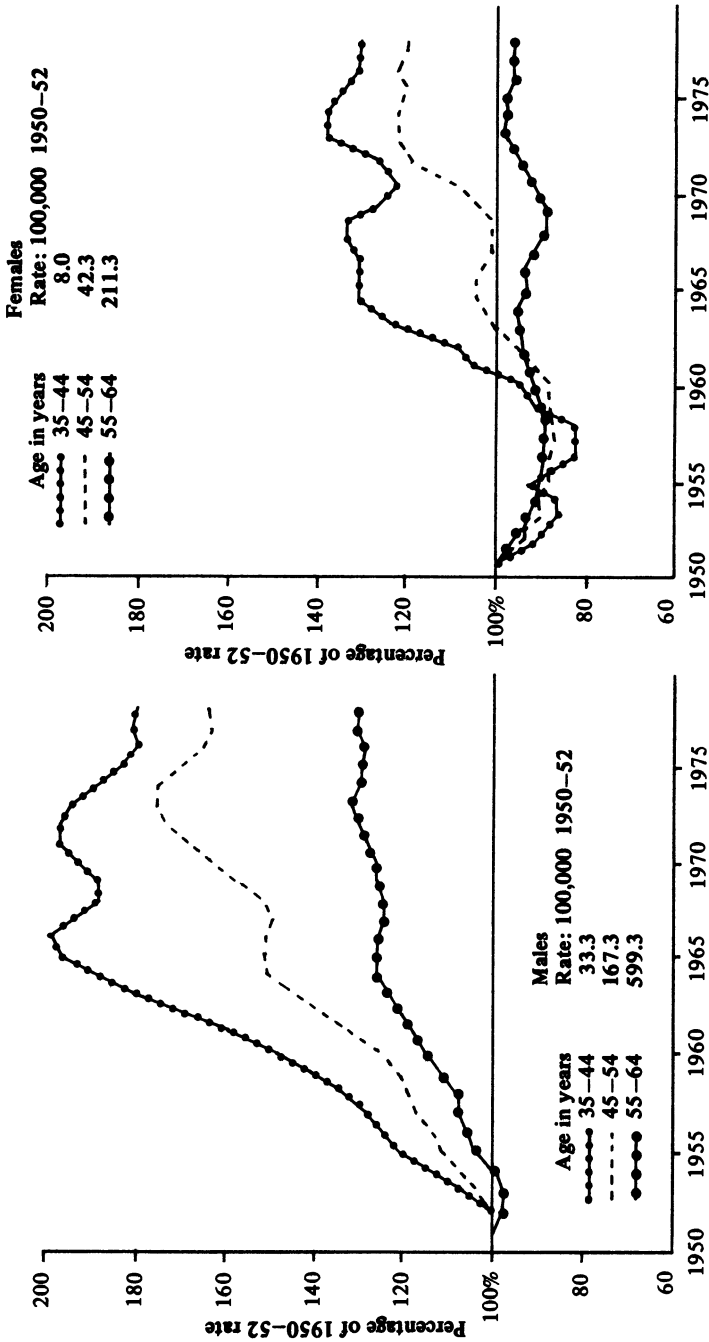


**Figure 2.16** Deaths from coronary heart disease in the United Kingdom by age group and sex, 1978. Numbers and proportion of deaths from all causes. Source: DHSS (1981). *Prevention and Health: Avoiding Heart Attacks*. (London: HMSO)



\* Age – adjusted to U.K. population 1976.

**Figure 2.17** Death rate of males and females from coronary heart disease at ages 15–74 years in 24 countries, 1974–76. Source: DHSS (1981). *Prevention and Health; Avoiding Heart Attacks*. (London: HMSO)



- (1) 1950-1967 International Classification of Diseases (7), categories 420-422  
1968-1978 International Classification of Diseases (8), categories 410-414

**Figure 2.18** Change in death rates of men and women in three age groups (from 35-64 years) from coronary heart disease<sup>1</sup> in England and Wales, 1950-1978 (3-year moving averages 1950-1952 = 100%). Source: DHSS (1981). *Prevention and Health: Avoiding Heart Attacks*. (London: HMSO)

coronary heart disease. Figure 2.17 shows that Finland has the highest mortality rate from the disease and that all the countries in the United Kingdom have higher death rates than some other European countries such as Sweden, Norway, France and Belgium.

In addition to the variation between countries in mortality from the disease, there are similar differences in its incidence. The international coronary community register study described above shows that the highest annual incidence of acute myocardial infarction (in males) was in Helsinki. Within the United Kingdom, mortality from the disease varies, the highest rate being seen in parts of Scotland.

The 'epidemic' increase of coronary heart disease over the past 50 years has been alluded to previously. Knowing the size of the problem today it seems scarcely credible that the great physicians of the turn of the century saw few cases of the disease throughout a whole professional career, in fact it was a clinical rarity. A small part of this great difference must reflect the fact that the disease went unrecognized in the past; nevertheless much of the increase is 'real'.

The increase in mortality since the early 1950s is depicted in Figure 2.18 which shows that the greatest increase is in the youngest age group (35–44 years). The increase has been greater in males than in females, with a recent slight fall in the youngest male age groups.

### *Aetiology*

A great deal of research work has focussed on identification of risk factors for coronary heart disease. Some are now established beyond reasonable doubt, in others, the evidence is suggestive but not conclusive, and in other instances there are opinions both ways on postulated causes. As is discussed in Chapter 3, given the present state of knowledge, the causation of coronary heart disease could be described as 'multifactorial'.

(a) *Cigarette smoking.* The main data regarding smoking and coronary heart disease may be summarized as follows:

- (i) Autopsy studies have shown that cigarette smoking increases the extent of atheroma formation in the coronary arteries.
- (ii) Cigarette smoking is a major risk factor in the genesis of acute myocardial infarction (AMI) in both sexes and is dose-related (i.e. increases with the amount smoked). The greatest risk of AMI in smokers compared to non-smokers is in the youngest age groups, the differences decrease in the older age groups. This age-related effect could be due to the elimination (by death) of susceptible individuals at younger ages or probably, more

Table 2.17 Myocardial infarction by blood-pressure levels: systolic and diastolic, average annual incidence rates per 1000

Systolic (mmHg)	Men (all ages)			Women (all ages)		
	Incidence rate	Diastolic (mmHg)	Incidence rate	Systolic (mmHg)	Incidence rate	Diastolic (mmHg)
<120	3.0	<76	5.3	<120	0.7	<76
120-139	5.6	76-89	5.3	120-139	1.1	76-89
140-159	10.7	90-99	8.9	140-159	3.5	90-99
160-179	15.2	100-107	7.7	160-179	3.2	100-107
180 +	18.3	108 +	11.3	180 +	8.6	108 +

Source: Dawber, T. (1980). *The Framingham Study: The Epidemiology of Atherosclerotic Disease*. (Cambridge, MA: Harvard University Press)

importantly, the greater influence of risk factors other than smoking in the older age groups.

- (iii) Although cigarette smoking is an independent risk factor in AMI, it may also act in a synergistic fashion with high blood pressure and raised blood cholesterol.
- (iv) The occurrence of sudden death is strongly related to cigarette smoking and though the risk for smokers compared to non-smokers decreases with age, it persists even into the older age groups.
- (v) Cigarette smokers (compared to non-smokers) are at greater risk of developing angina pectoris, but the relationship is weaker than for the other forms of coronary heart disease.

(b) *Hypertension.* Raised blood pressure is another major risk factor in the development of coronary heart disease: rises in both systolic and diastolic components are important in increasing risk in both sexes (Table 2.17).

(c) *Serum cholesterol and dietary fat.* There is little doubt about the importance of raised serum cholesterol as a risk factor: higher concentrations lead to greater risk of death. For example, in the Framingham study of cardiovascular disease,<sup>3</sup> involving a 24-year observation period, in the youngest age group the risk of development of acute myocardial infarction for men with serum cholesterol values of 260 mg% was four times greater than those with less than 200 mg%; the value dropped to around double in the older age groups. For women, the highest risk occurred with cholesterol value above 260 mg%, but there was no gradient. More recently it has been suggested that a more sensitive indicator of risk can be derived by measuring the high-density lipoprotein (HDL) and low-density lipoprotein (LDL) fractions of cholesterol: the latter apparently increasing risk of coronary heart diseases and the former reducing it.

The link between raised serum cholesterol and intake of dietary fat is complex. It is true that in Western countries where the lifestyle is affluent, the diet is usually high in saturated (mainly animal) fats as opposed to polyunsaturated (mainly vegetable) fats, and rates of coronary heart disease are high. Experimental animal studies have shown that diets rich in saturated fats lead to greater deposition of atheroma in the arteries. Diet studies of populations and groups of people have shown a strong relationship between saturated fat and cholesterol composition of diet and mean population cholesterol level. Individual people vary greatly, however, in how dietary intakes of various compositions affect their blood cholesterol levels, and little

association has been unequivocally demonstrated between individual dietary intakes of fat and coronary heart disease. This may be because of genetic variation or the difficulty in accurately measuring diet in individuals, but this discrepancy in surveys is the main reason why there is disagreement about whether dietary policy should be implemented on a population basis as a preventive measure in coronary heart disease.

(d) *Other dietary factors.* Although the precise mechanism is unknown, there is evidence that a diet high in fibre reduces risk from coronary heart disease. High sugar consumption has also been implicated as a risk factor, but clear evidence is lacking.

(e) *Exercise.* Regular and vigorous physical activity appears to confer protection against coronary heart disease, although the level of physical activity required is not sufficiently delineated thus far. This beneficial effect of exercise can be overcome if other adverse factors are present.

(f) *Obesity.* Risk of coronary heart disease increases in individuals who are above the 'average' weight for their height, a large part of the adverse effect of obesity is, however, mediated through the fact that it raises blood pressure.

(g) *Other risk factors.* Diabetes mellitus increases the risk of all aspects of ischaemic heart disease. A role for a wide variety of other factors has been claimed and the conflicting views about their importance are extremely difficult to evaluate. Such factors include: personality type, stress, water softness and consumption of coffee.

### *Scope for prevention*

The major potential for prevention in coronary heart disease is with respect to 'primary' prevention, directed against the known risk factors. The approaches to the control of cigarette smoking and hypertension are discussed in other sections (lung cancer and stroke respectively).

The approach to the modification of diet as a means of reducing blood lipid levels is more controversial. The points of controversy in interpreting the role of diet in coronary heart disease were discussed in the previous section in relation to aetiology. The greatest debate is over the wisdom of increasing the proportion of polyunsaturated fats in the diet, and the possibility of an increased risk of some forms of cancer. However, these suggestions are not consistently supported by scientific evidence. For example, countries in which such diets are habitual (e.g.

**Table 2.18 Dietary guidelines recommended by a World Health Organization Expert Committee on prevention of coronary heart disease**

<i>Emphasize:</i>	<i>De-emphasize:</i>
<ul style="list-style-type: none"> <li>- appropriately combined foods of plant origin: beans, cereal grains, vegetables (cooked and raw), and fruit (offering good-quality protein, low fat, low saturated fat, low cholesterol, low sodium, low refined sugar, high complex carbohydrates, high minerals, vitamins and fibre, and lower energy intake);</li> <li>- fish, poultry and lean meats, used in small portions and eaten less often as the main dish (offering good-quality protein, low fat, low saturated fat, low cholesterol, and lower energy intake);</li> <li>- low-fat dairy products for adults (offering good-quality protein and minerals, low saturated fat, low cholesterol, and lower energy intake);</li> <li>- less oils and fats in food preparation and in spreads; preference to be given to liquid vegetable oils.</li> </ul>	<ul style="list-style-type: none"> <li>- high-fat meats from domestic breeds as principal protein source (also high in saturated fat and cholesterol; and providing high energy intake);</li> <li>- high-fat dairy products: whole milk, cream, cheeses (also high in saturated fats and cholesterol; and providing high energy intake);</li> <li>- whole eggs, unless a major source of protein (egg yolks are high in dietary cholesterol);</li> <li>- commercially baked products (high in saturated fat and providing high energy intake);</li> <li>- alcoholic beverages (providing high energy intake; low in nutrients).</li> </ul>

Source: World Health Organization (1982). *Prevention of Coronary Heart Disease: report of a WHO Expert Committee*, Technical Report Series 678. (Geneva: World Health Organization)

Greece) show no excess for these other diseases.

There is no detailed government dietary policy in Britain in the context of preventing coronary heart disease, although a joint working party of the Royal College of Physicians and the British Cardiac Society reporting in 1976 recommended some degree of substitution of saturated fats in the diet with polyunsaturates. Other countries have taken firmer initiatives. In the United States, a series of national dietary goals have been produced by a Select Committee of the United States Senate. Recently a World Health Organization Expert Committee has produced dietary guidelines needed to achieve an optimum mean population cholesterol level (less than 200 mg/dl) in adults. The following dietary changes were proposed:



- (a) a reduction in saturated fat and dietary cholesterol, which together are the primary factors that raise blood-cholesterol levels; this can be assisted by replacing some of the saturated fat by mono-unsaturated and polyunsaturated fat;
- (b) an increase in complex carbohydrate consumption;
- (c) avoidance or correction of overweight; and
- (d) a reduction of cholesterol intake to below 100 mg per 4.18 MJ (1000 kcal) per day, or below an average of 300 mg for the adult population.

The means of achieving this were also recommended in the form of dietary guidelines shown in Table 2.18.

An increase in the fibre content of diet would also seem a prudent preventive strategy, since it may also be implicated in other Western diseases (e.g. diverticulitis and large bowel cancer).

The reduction of weight to the recommended desirable level for the person's build and body frame is also an important goal. Similarly, health education programmes to increase physical exercise would be expected to have an important impact in preventing or delaying the onset of coronary heart disease.

## **Cerebrovascular disease**

### *Size of the problem*

There are a number of serious difficulties in accurately describing the frequency of cerebrovascular disease or 'stroke', in a population. Most importantly, is the problem of precisely enumerating all cases of the disease which occur because of the difficulty of detecting and unequivocally labelling cases on clinical grounds.

Four underlying pathological mechanisms are involved: cerebral thrombosis, cerebral haemorrhage, cerebral embolism and subarachnoid haemorrhage. The clinical manifestations of these disease processes are extremely diverse, ranging from small lesions which produce few if any physical signs to a florid neurological picture. The classical picture of hemiplegia and dysphasia is by no means universal.

*Mortality.* These limitations also apply to estimating mortality from cerebrovascular disease. Only a small proportion of deaths come to post-mortem and it is likely that certified causes of death will under-enumerate deaths from the disease, particularly in older age groups. Bearing in mind these limitations, that is to say that it can only be regarded as a crude index of the true mortality arising from the disease, a high proportion of deaths are nevertheless attributed to cerebrovascular disease, which is thus a leading cause of death: in 1980 in

England and Wales 27 348 deaths in men and 44 095 in women of all ages were attributed to cerebrovascular disease.

*Incidence.* As with ischaemic heart disease, estimates of the incidence of the disease cannot be gleaned from routinely available statistics such as hospital inpatient data for the same reasons as discussed above: lack of uniform and adequate diagnostic criteria and under-enumeration of cases.

Incidence rates for cerebrovascular disease must therefore also be estimated from community surveys, but again the problems of case detection and definition are much greater than even for coronary heart disease, so that even in carefully conducted studies findings must be interpreted with caution.

### *Patterns*

Both mortality and incidence increase rapidly with increasing age. Rates for males are higher in most age groups than those for females. There are ethnic differences: for example, blacks in the United States are affected more frequently than whites. There is a social class gradient with higher mortality in the lower social-class groups.

Mortality from cerebrovascular disease has declined, particularly over the last decade. In England and Wales in 1968 the mortality rate in females of all ages was 1955 per million population: in 1980, the corresponding figure was 1746 per million. A similar decline has occurred in males and in individual age-specific mortality rates in both sexes.

### *Aetiology*

The main risk factor is raised blood pressure: linear increases in the frequency of stroke occur with rises in both systolic and diastolic blood pressure. As a consequence factors (such as obesity) which contribute to hypertension are also risk factors in stroke. Risk is also increased with pre-existing heart disease, clinically apparent diabetes mellitus and previous transient cerebral ischaemic attacks. The evidence concerning raised blood lipids and cigarette smoking, though conflicting, suggests that they are not major factors as they are in ischaemic heart disease.

### *Scope for prevention*

Scope for primary prevention of this disease is mainly limited to eliminating or reducing risk factors which are important in the production of hypertension: most importantly the reduction of obesity. The evidence for an impact of anti-smoking policy on this disease is equivocal, but given its association with other important causes of death it would be advocated on those grounds in any case. It

has been suggested that dietary salt has a role in producing hypertension in a way that is so far unclear and whilst the evidence here is also unproven at present the reduction of a large amount of salt in many Western diets would seem a desirable goal.

Aside from these measures another important dimension to the prevention of stroke is the control of established hypertension. Rapid advances have taken place over the last two decades in the development of anti-hypertensive drugs which are effective without having the severity of side effects of earlier drugs, although these have not been eliminated. Early studies have been confirmed in that mortality from stroke and other related causes can be reduced with anti-hypertensive therapy. The step from research studies demonstrating control of hypertension and hence reduction of stroke (and ischaemic heart disease) to advocating population detection on a wide scale is not a straightforward one. Many complex issues are raised. First is the question of screening an apparently healthy population to detect abnormality and the principles here are discussed fully in Chapter 3. In the case of hypertension, the benefits of reducing or delaying death and disability from its sequelae must be balanced against the physical, social and psychological impact of putting a sizeable proportion of the population on therapy for life, in addition to the direct financial consequences. Secondly, there are other important practical issues raised by the population approach. There is evidence that even if cases of hypertension are detected, to bring their blood pressure under control, which is after all the purpose of screening, would not be easy to achieve across a whole population. Non-compliance with therapy by patients is an important cause of failure of anti-hypertensive therapy. It may be difficult to persuade people who do not experience symptoms to remain diligently on therapy over a period of many years. Similarly, some individuals may experience side effects which may lead to them discontinuing their therapy. Within the medical profession itself there may be scope for improving knowledge about the principles on which such control is based. Most importantly, there has been disagreement about what level of blood pressure to include in such potential preventive programmes. The evidence that treatment of mild hypertension (diastolic pressures between 90 and 104 mmHg) can significantly lower mortality compared to control groups has heightened the debate, because a much larger population would then be covered by screening programmes. Current thinking appears to favour identification and treatment of moderate (diastolic pressure 105–114 mmHg) and severe (diastolic pressure 115 mmHg and greater) hypertension: this can be carried out in general practice in collaboration with hospital outpatient departments.

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## Origin of diseases and their prevention

### THE EMERGENCE OF THE CONCEPT OF CAUSE

#### Early concepts

The writings and teachings of Hippocrates had an impact far beyond his life-time, which began on the island of Cos near the Ionian Coast of Asia Minor, about 460 BC and ended (legend has it) when bees swarmed on his grave producing a special honey: the cure for stomatitis in infants. Hippocrates is regarded by many as the father of medicine, although medicine was practised before this time; indeed writings on such matters date back to the earliest civilizations. In Hippocrates' time, however, there were no boundaries between medicine, art, religion or philosophy.

One of the main contributions of the Hippocratic School lay in focusing intellectual attention on medicine in its own right, a science, in other words, founded on the observation of facts. One of the major teachings was that the body contained four humours: blood, black bile, yellow bile and phlegm. In health the humours mingled together and were in harmony or balance; in disease there was a derangement of this mixture.

Hippocrates was the first to seek to explain the origins of disease and in so doing he put forward many observations which do not seem out of place even today. He distinguished between diseases which were endemic (always present in a given area) and those which at times become excessively common (epidemic). In suggesting a role for exercise, diet, climate, water and the seasons he foreshadowed the modern views of the importance of the interrelationship between man and his environment in the causation of disease.

In the Roman Empire which eclipsed its Greek predecessor, the name of Galen, who lived in the second century AD, stands out in the history of medicine. Although he did much to advance knowledge in relation to anatomy and physiology, his observations on the nature and cause of disease added little to the Hippocratic writings.

Throughout the Dark and Middle Ages, Europe was ravaged by disease and pestilence: the plague, smallpox, diphtheria, tuberculosis and leprosy. Millions of lives were lost to these scourges of mankind. It is clearly apparent from reading about the measures which were adopted at the time to combat these diseases that they were understood to be contagious. For example, sufferers from leprosy were isolated and required to carry bells to warn of their approach. There was no suggestion, however, at this time of a contagious agent; rather, such diseases were held to be caused by changes in the composition of the atmosphere ('bad air') arising from stagnant or decaying organic matter.

Fracastorius (1478–1553), a Veronese poet and physician, is best remembered for writing a long poem about syphilis or the 'French disease'. His views on the general nature and cause of infectious diseases were, however, remarkable and were expressed some 200 years before such ideas were embraced as new and revolutionary. Fracastorius compared contagion in disease to the putrefaction that passes from one fruit to another when it rots. Moreover, when he referred to the 'essential nature of infection' he suggested that minute particles or seeds were conveyed from person to person and propagated themselves. This first mention of the possibility that diseases are caused by specific 'germs' attracted little attention at the time it was published.

### **The miasma**

Thomas Sydenham (1624–1689) was essentially a practical physician who regarded experimental physiology, so much in vogue at the time, with contempt. His philosophy was to set aside all theory and begin by observing and recording symptoms and signs and their progression (march of events) in the sufferer from the particular ailment. He is greatly revered for his classical descriptions of diseases such as gout, measles, scarlet fever and pneumonia. Yet, despite his genius in this respect, Sydenham added little to the understanding of why people became ill. But because of his stature, his miasmatic theory of the causation of disease – little more than a re-expression of earlier ideas – was much more influential than it deserved to be. The miasma was an unidentified vapour believed to result from mysterious changes in the air. It is easy now to scoff at such an apparently preposterous suggestion, yet as recently as the second half of the last century, many medical officers of health in their annual reports still related epidemics of infectious diseases to bad odours arising in a locality.

The fact that the true nature of infectious disease had not been revealed did not, however, impede progress.

### **Bills of Mortality**

An important, though less spectacular contribution, to this progress

was the start of gathering mortality data. Before causes of disease can be investigated or preventive measures are initiated, it is essential to have an indication of the size of the problem. Statistics which would allow the various outbreaks of infectious diseases to be traced, originated from the work of a man who died in impoverished circumstances towards the end of the seventeenth century. This man, John Graunt (1620–1674), analysed the statistics which he gleaned from the Bills of Mortality. These Bills were broadsheets issued weekly and listed, for the London parishes, the numbers and (in a crude fashion) causes of death. They were purchased by well-to-do people who could forewarn themselves of an outbreak of the plague and forsake the city for less hazardous surroundings.

Graunt laid the foundation for the work of his illustrious successor William Farr (1807–1883), whose statistical writings from the office of the Registrar General served as the basis for the great sanitary reforms.

### **The Broad Street pump**

There is one episode on the road to the discovery of the true nature of infectious disease which has assumed almost romantic proportions to students and practitioners of preventive medicine: that of the investigation of the London cholera outbreak of 1854. John Snow (1813–1858), a Yorkshireman, could justifiably have settled for one claim to immortality as the first man to introduce the anaesthetic when he used chloroform in the delivery of two of Queen Victoria's children. Yet, it was his interest in cholera and his painstaking investigation of an outbreak of this disease, which earned him a further place in medicine's Hall of Fame.

Cholera is a major infectious disease which spreads rapidly and causes death by the gross fluid depletion that results from the intense diarrhoea produced by the infection. It is rare today in the Western world, but is still a serious cause of mortality in some developing countries. During the early nineteenth century, however, epidemics of cholera swept through London killing thousands of people.

Snow's own words best describe the outbreak in 1854:

The most terrible outbreak of cholera which ever occurred in this kingdom is probably that which took place in Broad Street, Golden Square and adjoining streets, a few weeks ago. Within two hundred and fifty yards of the spot where Cambridge Street joins Broad Street, there were upwards of five hundred fatal attacks of cholera in ten days. The mortality in this limited area probably equals any that was ever caused in this country, even by the plague; and it was much more sudden, as the greater number of cases terminated in a few hours. The mortality would undoubtedly have been much greater had it not been for the flight of the population

By plotting the geographical location of each case Snow deduced that

the deaths had occurred amongst people living in close proximity to the Broad Street pump (many families at this time had no water supply in their own homes but used such a communal supply). There were one or two pieces of evidence, however, which did not at first seem to fit Snow's theory of the complicity of the pump. Firstly, a workhouse with 535 inmates in a street very close to the Broad Street pump experienced only five deaths from cholera amongst its population. Secondly, a brewery, in Broad Street itself, had no fatalities amongst its workforce. Snow investigated these differences and found that the workhouse had its own pump on the premises whilst the workers in the brewery never frequented the Broad Street pump. Finally, Snow turned his attention to a woman and her niece living at a considerable distance from Broad Street who, nevertheless, died of cholera during the epidemic. As a result of his interview, with neighbours and next of kin, Snow ascertained that the woman had a particular liking for the flavour of the water of the Broad Street pump and sent her son to it every day for a bottle to drink.

On completing his enquiries Snow sought an interview with the Board of Guardians of St James' parish (who were in charge of the pump) and as a result of his representations the pump handle was removed and the epidemic which was already declining came to an end.

The importance of the removal of the pump handle was symbolic of a new understanding of the nature of disease, for Snow had demonstrated that disease can be conveyed by water and specifically that cholera is a waterborne disease.

In a less dramatic but similarly painstaking series of other investigations, Snow further clarified the mode of transmission of cholera. In London, at that time, a number of private companies supplied water to its residents and Londoners paid for their supply. Snow turned his attention to the water supplies of two of these companies: the Lambeth company and the Southwark and Vauxhall company which both supplied similar areas of London. The pipes of both companies in some cases went down the same street, so that it was possible to identify individual households supplied by one or other company. The death rate from cholera in the areas of London supplied by these two water companies was much higher than it was in places supplied by other companies. Both obtained their supply from the lower part of the Thames which was, then, the one most greatly contaminated by sewage.

A chance occurrence in 1852 provided Snow with a marvellous opportunity for a natural 'experiment'. In that year the Lambeth water company changed its intake to another source which was free from sewage. Snow obtained the addresses of all people dying of cholera and sought information on the source of the water supply to each house-



hold. During the epidemic in the year of 1853 Snow found that there were 71 fatal attacks of cholera per 10 000 households supplied by the Southwark and Vauxhall company, compared with only five per 10 000 in those supplied by the Lambeth company. In other words, people getting their water from the polluted part of the Thames had 14 times more fatal attacks of cholera than those getting their supply from the purer source.

Snow's theory of the mode of transmission of cholera then appeared to be vindicated. He considered that cholera was spread from person to person, the sick to the healthy, rather than by contact with any miasma or similar substance. Moreover, he deduced that this spread took place via morbid material from the alimentary canal of the sufferer which was then swallowed by other people and had the power of multiplication in the body of the person it attacked.

Even so clear an explanation, backed up by Snow's careful scientific observations, failed to convince the many doubters who still categorically rejected the idea of a specific contagion in the cause of disease.

### **The germ theory**

The invention of the microscope around 1670 had allowed living organisms to be seen for the first time. Leeuwenhoek (1632–1725), a Dutchman, examined a range of materials such as saliva, blood, water and faeces and made drawings of micro-organisms including what are now clearly recognizable as bacteria. No attempt was made, however, to associate these living organisms with disease in man; for example, there is no evidence that Snow saw them as the morbid material he suggested as a cause of cholera. Indeed a separate controversy existed as to the origins of these micro-organisms themselves. Some scientists believed that they arose *de novo* (by 'spontaneous generation') from the fluids in which they were discovered.

Two names stand out as those who transformed causal thinking and finally gave birth to the germ theory of disease which had been so slow in its gestation: Louis Pasteur (1822–1895) and Robert Koch (1843–1910).

Pasteur firmly rejected the idea of spontaneous generation, believing that micro-organisms came from the air and settled on the culture media in which they were found. To prove his theory, he conducted an experiment in which he filled two flasks with suitable culture medium. These flasks were then heated to kill any organisms that were likely to be present in the medium; one was covered and the other left open. Bacteria quickly appeared in the uncovered flask but not in the covered one, thus firmly refuting the idea of spontaneous generation. Development of preparation and staining techniques allowed Robert Koch, a German, to isolate the tubercle bacillus (1882) and the cholera

vibrio (1883). In a very short period of time a wide range of organisms were identified and linked to disease in man: *Bacillus anthracis* (anthrax), *Corynebacterium diphtheriae* (diphtheria), *Mycobacterium leprae* (leprosy) and *Salmonella typhi* (typhoid fever). The practical applications of the work were not slow to be realized. Joseph (later Lord) Lister took up Pasteur's ideas and using carbolic acid during surgery founded the modern methods of antisepsis that transformed the nature of the hospital wards from places where virtually every post-operative case became septic, and developed fever.

Such was the enthusiasm with which the medical establishment now embraced the germ theory of disease that attempts were made to link virtually every known disease to a specific causal contagious agent. Claim and counterclaim abounded. It was left to the Nobel laureate, Robert Koch, who had begun his career as a general practitioner in Germany, to impose a scientific discipline to check this bandwagon effect in which the hunt for micro-organisms in diseases led to causal inferences being made on very flimsy grounds.

Koch's postulates, sometimes also referred to as the Henle-Koch postulates (Koch was Henle's pupil) may be summarized as follows:

- (1) The organism should be isolated in pure culture from each case of the disease.
- (2) It should not occur in any other disease as a fortuitous and non-pathogenic occurrence.
- (3) Once isolated it should be grown in a series of cultures.
- (4) This culture should reproduce the disease on inoculation into an experimental animal.

It is clear today that Koch's postulates, if interpreted literally, are too rigid and would exclude most viral diseases and also many bacterial diseases from having a proven causative agent. Nevertheless, they served as an important landmark at the time.

### **The search for other causative agents**

Almost at once, the germ theory of the causation of disease dispelled myths, superstitions and ill-conceived quasi-scientific theories which had stood for centuries. It should be remembered that at that time, the infectious diseases were the major killing diseases, so the excitement produced by the revelation of the causative role of micro-organisms was quite understandable. Nevertheless, there were other landmarks in causal thinking in which specific agents other than micro-organisms were linked with diseases.

The possibility that factors in Man's occupation could be a cause of illness and disease was largely ignored in ancient writings, despite the grim and inhuman working conditions which were produced, for

instance, in the quest for valuable metals in the mines of ancient Egypt, Greece or Rome. After the Renaissance, there emerged a man who is generally regarded as the father of occupational medicine: Bernado Ramazzini (1633–1714). His *De Morbis Artificum*, published in about 1700, was a systematic study of diseases arising from occupational factors. When in his writings he recommended that in addition to other questions and examinations, the doctor should ask the question ‘What is your occupation?’, he could scarcely have realized the enormous importance of his words.

Subsequently, occupational medicine has had a long and distinguished history. Discoveries such as Percival Pott’s observation in 1775 of the occurrence of scrotal cancer in chimney sweeps as a result of persistent contact with soot or the cerebral effects of mercury poisoning in the hat-making trade (the basis of Lewis Carroll’s *Mad Hatter*) opened new vistas when considering possible causes of disease.

### *Role of diet*

Another field of study in disease causation is to be found in those conditions which arise because of lack or excess of some specific substance in the diet. A classic account is to be found in the work of James Lind, a surgeon in the Royal Navy at a time when long voyages were commonplace and provisions taken on board were those that could withstand such voyages without perishing. Sailors were afflicted, after a time at sea, by a strange malady: lethargy and weakness, pains in the joints and limbs and swelling of the gums. This was scurvy and it cost many thousands of lives on the great sailing ships of the time. In 1747 Lind performed an experiment in which he added different substances to the diet of 12 sailors on such a voyage. He divided his patients into pairs and supplemented the diets of each pair with: cider, elixir vitriol, vinegar, sea water, a mixture of nutmeg, garlic, mustard and tamarind in barley water, and two oranges and one lemon daily. Only the sailors given oranges and lemons recovered. Thus, long before vitamin C was isolated, Lind had determined the cause and instituted preventive measures to redress the dietary deficiency. Sailors on long voyages took supplies of fruit juice and the tendency to use limes led to the nickname ‘limeys’ for British sailors.

### **The importance of the host**

In parallel with the development of the concept of a contagion in the cause of infectious diseases, activity was also being directed to the capacity of the person to resist infection. It had been known since ancient times that people who had suffered from certain diseases and survived, rarely contracted them a second time.

This observation led to the practice in smallpox of deliberate inoculation with material from a diseased person, in the belief that a milder infection would ensue than from a natural infection. The risks were great since the people being inoculated were acquiring a real attack of smallpox. Smallpox was one of the major scourges of the past, often called the 'minister of death'. It is estimated that during the eighteenth century 60 million people died from the disease in Europe alone. Towards the end of the eighteenth century Edward Jenner, a country physician in Gloucestershire, decided to investigate a piece of local folklore relating to the disease. It was well-known by country people that milkmaids often acquired, from infected cows, a disease called 'cowpox' which gave rise to a pustule on the finger or crop of pustules on the body. It was believed that girls who contracted this mild disease would not contract smallpox when they were exposed to it. This observation is probably the origin of the rhyme:

'Where are you going my pretty maid?'

'I'm going a-milking, Sir', she said.

'What is your fortune my pretty maid?'

'My face is my fortune, Sir', she said.

In 1779, Jenner took material from the sore of a milkmaid called Sarah Nelmes who had cowpox and scratched it on to the arm of a boy, James Phipps. In an experiment which would be considered quite unethical today, the boy was then exposed to a case of smallpox. He did not develop the disease and Jenner's experiment was repeated on others with similarly successful results. Thus, the practice of vaccination became widespread, although it was a very different procedure from that practised today. Material was scratched from arm to arm amongst vaccinees without any antiseptic precautions and complications were thus common. Despite its obvious historical importance and success in retrospect, Jenner's discovery was not universally accepted at the time, indeed some quarters of the medical establishment bitterly denounced him as a charlatan.

Almost a century later, a further great advance was made in knowledge of how to protect the host against disease. On this occasion Louis Pasteur who had developed techniques of immunization of animals against anthrax turned his attention to rabies in humans. Rabies, a disease of the dog, was one of the most feared diseases because of its universal fatality. At different periods in history it had been attributed to the sun, the weather or the dog star. Although existing technology meant that he could not see or produce a free culture of the rabies virus, Pasteur reasoned that it existed in the saliva and nervous system of infected animals and was the mode of transmission of the disease. He injected material from infected animals

attenuated by desiccation into other animals and protected them against the disease.

In July of 1885 a nine-year-old boy from Alsace, Joseph Meister, was brought to Pasteur's laboratory by his mother. The child whilst walking to school on his own had been pounced on and bitten 14 times by a mad dog before it was beaten off by a labourer. Pasteur was a chemist, not a physician, and consulted with his medical colleagues as to whether his success in the immunization of animals against rabies justified using it on a human being. It was decided that the child faced almost certain death and thus a course of immunization was begun which lasted ten days. The child survived and Pasteur allowed himself the following excess of emotion when he wrote to his family '... perhaps one of the great medical facts of the century is going to take place; you would regret not having seen it!'.<sup>1</sup> A new era in preventive medicine had dawned.

Despite the attention which was directed towards producing specific immunity in the host to allow a person to resist disease, concern with other more general factors was singularly absent.

In spite of the investigation of workers like Lind into the absence of specific dietary factors in the cause of disease, the role of nutrition was generally ignored, although the majority of the population at most periods of history was seriously undernourished. Despite the fact that such a state of affairs limits the individual's ability to resist infection and compounds the sequelae of the disease, measures against under-nutrition were not taken until well into the present century.

## **MODERN CONCEPTS OF CAUSE**

### **Establishing a causal relationship**

If the laboratory scientist wishes to investigate whether or not a suspected cause results in a particular outcome or effect, he frequently has at his disposal the experimental approach. Let us suppose, for example, that a particular chemical is suspected of causing breast cancer in white mice. The investigator could take a strain of white mice and allocate them at random into two groups: one group would receive the presumed causal chemical, the other group would be treated identically in all ways, except they would not receive the chemical. The investigator would then observe the occurrence of breast cancer in the two groups of animals, and draw conclusions. In the laboratory experiment, the investigator is in control of the events. Similar experiments to test the effect of a suspected causal factor in groups of humans, are usually quite unacceptable. Thus, if the same chemical which caused breast cancer in the white mice was suspected of causing breast cancer

in human females, an experiment could not be carried out in which one group of women was given the chemical and the other was not. Experiments may, however, be performed on groups of people where removal of a suspected causal factor or addition of a supposed beneficial factor could result in an improvement in health. The most usual 'experiment' carried out in humans is the controlled clinical trial in which new therapies are tested out on people with particular diseases.

Sometimes, fortuitously for the investigator but often to the great misfortune of the population concerned, 'natural' experiments take place which allow conclusions to be drawn about causation. Much of the knowledge on the role of atomic radiation in the cause of cancer has stemmed from observing the development of the disease in the survivors of Hiroshima and their progeny.

Usually, however, the 'experimental approach' is ruled out for ethical reasons when investigating the effects of causes in human populations.

Instead the search concentrates on associations between the factor or set of factors, and a disease. This observational approach involves comparing the disease experience of two or more groups of people in relation to their possession of certain characteristics or exposure to a suspected factor or factors. The main study strategies available are described in Chapter 1.

However, in these circumstances, the investigator is not in control of all external events as he is in the experimental situation, and great care is therefore necessary in drawing conclusions. A cohort study or a case-control study may establish that a factor and a disease are associated in a group of people, but that association is not necessarily causal. Non-causal associations may:

- (a) *Arise by chance* – the association between the factor and the disease may be a chance occurrence which would generally not be found on another occasion. Statistical tests exist, however, to allow a statement to be made of the probability with which the observed association would have arisen by chance on the hypothesis that there is, in fact, no association between the factor and the disease. If this probability is low, the inference is generally then made that the hypothesis by which the probability was derived is false; and that the observed association would rarely arise by chance, so consequently has a high probability of being a true association.
- (b) *Be spurious* – the apparent association between causal factor and disease may not be real, but a product of the way in which the investigation was carried out. For example, suppose that it was intended to investigate the association between place of

delivery (cause) and perinatal mortality (effect). A comparison of two groups of women might show that the perinatal mortality for those delivered in consultant obstetric units was higher than for women delivered in general practitioner maternity units. It might be concluded that general practitioner units were safer places in which to have a baby. Such a conclusion is almost certainly fallacious, however. In general, consultant obstetric units, because of their special expertise and equipment deliberately *select* women at high risk for delivery in their units. Thus, the consultant unit might have a higher perinatal mortality rate than the general practitioner unit because of this fact alone, and not because the quality of care was inferior. This source of bias where 'like' is not being compared with 'like' is very important and must be watched for carefully if erroneous conclusions about cause are not to be drawn.

Many other sources of bias in the conduct of studies, depending on their design, can also lead to spurious claims being made about causal relationships. For example, a surgeon notices that many female patients presenting at his outpatient clinic with breast lumps give a past history of localized trauma. To investigate this further, he takes two groups of women: one group comprises those who have presented to the outpatient clinic with a breast lump; the other comprises a sample of healthy women of similar ages. Each group of women is asked if they can recall having any bang, knock or bruise of the breast during the previous 12 months. A much higher occurrence of such trauma is found in the group with breast lumps than amongst the control group of healthy women. Should it then be concluded that localized trauma predisposes to the formation of breast lumps? This is possible but unlikely. Women who have developed a breast lump are often in a very anxious state and their principal fear is that the lump is malignant. They will often cling to any alternative explanation of the origin of the lump. Hence when such women are questioned about a history of trauma they are far more likely to remember and volunteer some trivial occurrence, than will those women without breast lumps. This type of bias is particularly important when undertaking case-control studies (see Chapter 1).

- (c) *Be secondarily associated* – the factor and the disease may appear to be associated in a causal fashion when in reality the reason for their association is that both are related to a third factor. Thus, an association is found between countries with a high proportion of television owners and the frequency of

coronary heart disease. The fact that these two factors are strongly associated does not mean that they are causally related and that television causes coronary heart disease. A more reasonable explanation is that television ownership is an indicator of prosperity and the trappings of prosperity such as overeating and lack of exercise are themselves causally related to coronary heart disease. Prosperity of a country is thus related to both television ownership and coronary heart disease and is the reason for the association between the two, but it is not the cause.

If an association between a factor and a disease is found which could not have occurred by chance, is not spurious and not due to a secondary association, then this does *not prove* that the association is causal. However, six criteria, if present, help to infer that the association is causal:

- (1) *Plausibility*. Greater weight is given to a possible causal factor if it seems to fit in with what is known about the pathology of the disease.
- (2) *Consistency*. The association would, if causal, be expected to persist when studies were carried out by different investigators working in different populations at different times.
- (3) *Temporal relationship*. Clearly to assess causality it is necessary to consider whether the factor preceded in time the development of the disease.
- (4) *Strength*. A causal relationship is more likely to be present when there is a marked difference in frequency of the disease in people who have been exposed to the factor than those who have not. An additional piece of evidence which is strongly indicative of causality is the presence of a dose-response relationship: with increasingly greater exposure to the risk factor the incidence of the disease rises.
- (5) *Specificity*. An ideal finding would be that the postulated causal factor was related to the disease in question and no other. This is, however, not always the case since a factor may be causally related to more than one disease.
- (6) *Removal*. If the factor is removed or reduced and the incidence of the disease falls, this strongly indicates that the factor is causal.

Some of these issues will be explored by describing the relationship between cigarette smoking and lung cancer.



*Smoking and lung cancer*

With the discovery of the New World by Columbus came the introduction of tobacco smoking to Europe: it had been a common practice amongst Indians of the Western hemisphere for centuries. Cigarette smoking was widespread in Britain by the beginning of the present century and its use transcended social-class divisions. It was not until after the Second World War that any thought was given to the possibility that smoke inhaled into the lungs might be harmful to health. Today it is known that a number of diseases have a causal relationship with cigarette smoking, but this relationship of cause to effect is most direct in the case of lung cancer, as is shown in the description of this disease in Chapter 2.

One of the early studies of the possible association between cigarette smoking and lung cancer enquired into the smoking history of lung cancer patients, of patients with other forms of cancer, and other hospital patients not known to have cancer. In this case-control study, the last two groups served as controls and were similar in age and sex to the lung cancer patients (the cases). Using such a method of enquiry it is possible that bias could arise due to differential recall of smoking habit by the lung cancer patients compared with the controls. As has been discussed above, this may mean that the association is spurious and not causal. However, the investigators were fortunate in having an additional group of patients: some patients, although they were believed to have lung cancer at the time of interview, were later cleared of having the disease. Table 3.1 shows the results of the study. Amongst the lung cancer patients there is a smaller proportion of non-smokers and light smokers and a higher proportion of heavy smokers than in the control groups. Moreover, the smoking habit of the patients originally believed to have lung cancer (but later found not to have had it) conformed with the control groups and not the lung cancer group. This is what would be expected if the method of enquiry were free of the type of bias mentioned.

Many other studies confirmed these findings and those which followed-up smokers over a period of time (including those of British doctors by the same workers) indicated that the rate of death from lung cancer rises with increasing cigarette consumption and that after stopping smoking, the risk of dying from lung cancer declines. The decline is rapid at first but takes about ten years to reach the level of life-time non-smokers.

Even in such a powerful cause-and-effect relationship, however, the role of the host cannot be discounted: only a proportion of heavy cigarette smokers will contract the disease. Although various mechanisms have been postulated, the reason for this is still unknown.

The precise mechanism by which cigarette smoking produces disease

Table 3.1 The smoking habits of patients with lung cancer and other diseases in a study to investigate the aetiology of lung cancer

Disease group	Percentage of non-smokers	Percentage smoking daily average of			No. of patients interviewed aged 45-74	
		Less than 5 cigs	5-14 cigs	15-24 cigs		25 cigs +
Men						
Carcinoma of lung	0.3	4.6	35.9	35.0	24.3	1224
Patients incorrectly thought to have carcinoma of lung	5.3	9.9	35.5	37.8	11.4	202
Other respiratory diseases	1.9	9.9	38.3	38.7	11.2	301
Other cancers	4.6	9.4	47.2	26.0	12.8	473
Other diseases	5.6	9.0	44.8	26.9	13.7	875
Women						
Carcinoma of lung	40.6	13.7	22.0	9.5	14.2	90
Patients incorrectly thought to have carcinoma of lung	66.9	16.4	12.7	4.2	0.0	45
Other respiratory diseases	66.5	22.4	0.0	11.1	0.0	25
Other cancers	68.4	14.3	11.0	5.0	1.3	294
Other diseases	55.9	22.1	17.5	3.6	0.9	157

Source: Doll, R. and Bradford Hill, A. (1952). A study of the aetiology of carcinoma of the lung. *Br. Med. J.*, 2, 1271-1286

**Table 3.2** Excess death rates (age-standardized) in male smokers attributable to various causes. Cardiovascular deaths account for more than half of the excess

<i>Cause</i>	<i>Excess deaths per 100 000 smokers per year</i>	
Lung cancer	94	(19%)
Chronic bronchitis and emphysema	47	(10%)
Coronary heart disease	152	(31%)
Other cardiovascular diseases, including stroke	100	(21%)
Other diseases	92	(19%)
Total	485	(100%)

Source: Royal College of Physicians Report (1977). *Smoking or Health*. (Tunbridge Wells, Kent: Pitman Medical)

has not yet been elucidated (it is thought to be a constituent of tar), but its undoubted causal association with many common diseases (Table 3.2) makes it one of the commonest reasons for disease, disability and premature death in Britain today.

### **The multifactorial concept of cause**

The concept of cause embodied in the germ theory is of a one-to-one relationship between causal agent and disease. It was soon realized however, that a more complicated relationship existed for most diseases. For example, it is only possible to develop pulmonary tuberculosis by being infected with the tubercle bacillus. Yet, not everyone who is exposed to it becomes infected and only a minority of cases will proceed to pulmonary tuberculosis. Thus, the realization that some people developed the disease because of their nutritional status or their genetic make-up led for a time to a 'seed and ground' model of causation, in which there was seen to be an interplay between causal agent and host. This was quickly superseded by the modern view of cause, which is the multifactorial one. It is now recognized that a disease is rarely caused by a single agent alone, but rather depends on a number of factors which combine to produce the disease. These factors may be grouped together under three main headings, although in reality their inter-relationship is intimate:

- (a) *Agent* - a specific agent may be recognized or presumed depending on the level of current knowledge. It may be a micro-

organism, a chemical or physical agent, or the presence or absence of a particular dietary substance.

- (b) *Host* – the involvement of the host in the causation of disease is today a much wider concept than it was in the past. Constitutional factors such as genetic make-up and general nutritional status are still important. More recently, however, the behaviour or life style of an individual, whereby he sets out on a road which will end in disease or ill-health, is seen to be of growing importance. A true understanding of the cause of many diseases means appreciating the complexity of factors (such as education, family and social background, occupation, economic status) which lead people to behave in a particular way.
- (c) *Environment* – similarly the concept of environment does not merely encompass physical, chemical and biological elements which have a bearing on health, but also the socio-cultural milieu in which the person lives. In this way many factors can be seen as implicated in the causal pathway of many of the common diseases. On the large scale the political and economic climate can have a distinct bearing on health. Moreover, the general attitudes and expectations of society through stress and many other manifestations, can become part of the web of causation.

Some of these concepts are illustrated by considering a disease which is currently regarded to be of multi-factorial origin, ischaemic (coronary) heart disease.

The presence of atheroma (atherosclerosis) in the arteries of the body is an almost universal occurrence which starts in early life and is a cause of much of the disease, disability and death in later life. Why these lipid (fat) deposits should accumulate on the innermost lining of the arteries is still unknown. The presence of atheroma in the coronary arteries, by occluding them, may lead to the clinical syndromes of angina pectoris, myocardial infarction and sudden death, although it should be emphasized that despite its presence, many people experience no symptoms.

The main risk factors which have been implicated in this disease process are discussed in detail in Chapter 2.

## LEVELS OF PREVENTION

Realistic possibilities of preventing a disease require an understanding of its natural history. From a healthy state through various stages

Table 3.3 Spectrum of health and disease with the main strategies for prevention at each level

Stages:	Health	Asymptomatic	Symptomatic	Outcomes:	Disability	Recovery	Death
Intervention strategies:	Health Education*, Immunization, Environmental measures and Social policy	Pre-symptomatic screening	Early diagnosis and prompt effective treatment		Rehabilitation		
Levels of prevention:	Primary	←	Secondary →		Tertiary		

\*Some of these strategies, particularly health education, can also operate at other levels

(asymptomatic, symptomatic) to an outcome which may be recovery, disability, or death, each disease has its own unique natural history. The stage at which intervention is effective varies with different diseases. It is too late to intervene when lung cancer has developed, but adequate treatment for established pulmonary tuberculosis nearly always results in a favourable outcome.

Aside from these considerations, to gain the maximum control of the disease process the practitioner must know something about the way his patients behave. The extent and ways in which people use health services is determined by many factors, including their perceptions of ill-health, and their social and cultural background (see also Chapter 4). Nor can it be assumed that when a course of therapy is prescribed by the doctor it will be adhered to by the patient. There is often little appreciation by doctors and nurses of the extent of compliance: how often does the hypertensive take his tablets? How carefully does the diabetic monitor his insulin requirements? Many patients attending their general practitioners fail to comply with the advice given. An understanding of these issues is essential to controlling a disease and preventing its complications.

Traditionally three levels of prevention are described (Table 3.3).

### **(1) Primary prevention**

This approach seeks actually to prevent the onset of a disease. Clearly this is the ultimate goal of preventive medicine: to alter some factor in the environment, to bring about a change in the status of the host, or to change his behaviour so that the disease fails to develop. Many of the triumphs of public health in the past, which have been described earlier, relating to the infectious diseases have been brought about by primary prevention. Similar victories over those modern maladies, the chronic degenerative diseases, seem, however, far from our grasp. Knowledge of causal mechanisms, whilst incomplete when set alongside the mode of spread of an infectious disease, is adequate to allow some action toward primary prevention in many cases. Yet, the strategies of preventive medicine do not seem to have come to grips with the sort of behavioural and societal manipulations necessary to allow these conquests to be made.

### **(2) Secondary prevention**

This level of prevention aims to halt the progression of a disease once it is established. The crux of this form of prevention is early detection or early diagnosis followed by prompt, effective treatment. Special consideration of secondary prevention aimed at asymptomatic individuals is necessary. Whilst it may seem to be merely a logical extension of good clinical practice, careful evaluation is necessary before early

disease detection is carried out on a population scale, and this is discussed in the section on screening.

### **(3) Tertiary prevention**

This level is concerned with rehabilitation of people with the established disease to minimize residual disabilities and complications. Action taken at this stage aims at improving the quality of life, even if the disease itself cannot be cured.

## **STRATEGIES IN PREVENTION**

The approaches used in the prevention of ill-health and disease differ from those used in the diagnostic and therapeutic branches of medicine. Although there is considerable overlap between the categories, the main strategies used in prevention may be grouped into:

- (1) Health education
- (2) Legislation and social policy change
- (3) Screening
- (4) Immunization and vaccination
- (5) Control of environmental health hazards

Chapter 10 deals with (5), while the others are discussed here.

### **Health education**

The World Health Organization in 1969 suggested that the aims of health education should be to persuade people to 'adopt and sustain healthful life practices, to use judiciously and wisely the health services available to them and to take their own decisions both individually and collectively to improve their health status and environment.'<sup>2</sup>

Expressed most simply, health education seeks to promote health and to prevent ill-health. Such a broad definition, however, has little utility since it conceals an enormous variety of aims from the general to the very specific. Health education may, for example, seek to: promote regular exercise in a population; ensure that hypertensive patients adhere to their prescribed treatment schedule; get more pregnant women to antenatal care at an earlier stage of their pregnancy than hitherto; or achieve high uptake by children of current immunization programmes.

How often do we hear an elderly person express his good fortune for having enjoyed a healthy life? This sentiment conveys the dual message that whilst Man values highly the state of health, he sees the risk of ill-health or disease as a matter of chance over which he has no control. If many people believe this, in the face of strong evidence that much modern disease is the result of unhealthy habits and unfavourable life-

style, then it must indicate some degree of failure of health education at a very basic level.

Health education is generally acknowledged as being one of the cornerstones of modern preventive medicine. Yet, as a discipline it is in its infancy. In part this reflects the way in which the importance of the idea is paid lip-service whilst its share of available health service resources remains very small. In addition, there is no doubt as to the complexity of the task facing health educators.

### *The process of health education*

The process of health education is complex, but in simple terms it can be viewed in three main phases:

- (1) Imparting knowledge
- (2) Changing attitudes
- (3) Altering behaviour

This is usually seen as a sequence in which people are first provided with information which emphasizes the benefits and risks of following particular courses of action. As a result of this, a change in attitude will result in a change of behaviour in the direction required to achieve the particular health education goal.

However, this 'straight line' process is now largely discounted because behavioural change can occur without change of attitude. A motorist may wear his seat belt to conform with the law, though he maintains a negative attitude towards its use. This should not detract from the importance of imparting knowledge about health, whether it is with the intention of changing behaviour, or for other reasons.

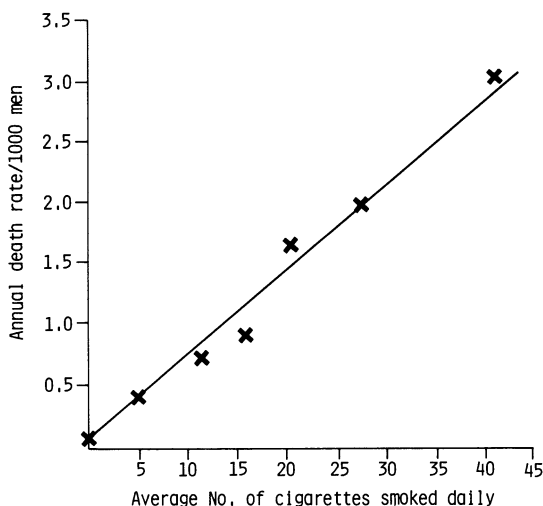
One successful demonstration of the success of the process of health education was initially limited to a somewhat exclusive group of people: doctors.

*British doctors and cigarette smoking.* In 1951, when the consumption of cigarettes by doctors in Britain was much the same as for all men, a cohort study of British doctors was carried out.

The starting point was a questionnaire classifying the respondents into current smokers, ex-smokers and non-smokers. They were followed up and the occurrence of deaths and their cause, and changes in smoking habit, were recorded. The early results showed that the overall mortality for cigarette smokers was 28% higher than for non-smokers. More revealingly, however, when causes of death were examined the now well-known relationship between increasing cigarette consumption and lung cancer was revealed (see Figure 3.1). Subsequent studies have shown the important association with smoking and other disease. As a result of these studies and the



publication of their findings, together with the Royal College of Physicians reports on smoking and health, doctors began to stop smoking (see Figure 3.2) and their mortality rates correspondingly fell (see Figure 3.3). The overwhelming evidence implicating smoking as harmful to health appears to have influenced other professional groups, as the numbers of male smokers in Social Classes I and II has declined (see Figure 3.4).

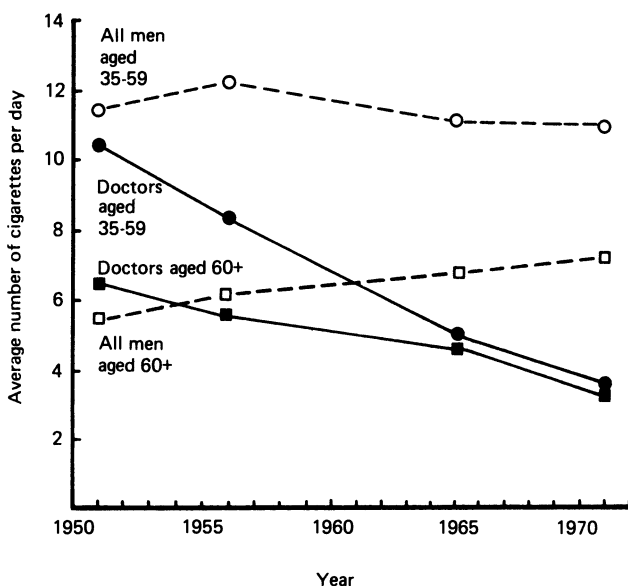


**Figure 3.1** Death rate from lung cancer in smokers. Source: Doll, R. and Hill, A.B. (1964). Mortality in relation to smoking: ten years' observations of British doctors. *Br. Med. J.*, 1, 1399-1410

Despite the modest success in health education terms for professional males, it is relevant to note that for men in Social Classes III, IV and V and for women (other than in Social Class I) there has been a smaller decline in smoking. This issue is further discussed in the section on scope for prevention in the description of lung cancer (see Chapter 2). Herein lies one of the main lessons of health education: the groups with the greatest health problems (generally in the lower social classes) have behaviour and lifestyle patterns which have been almost unaltered by health education.

However, changes in behaviour are difficult to achieve and require a long time span. It is unlikely that one single method can be successful, so different approaches should be used which in the end become cumulative. The slow reduction in cigarette smoking by Social Classes I and II has occurred over more than a decade and it is hoped that this change will spread to all social classes.

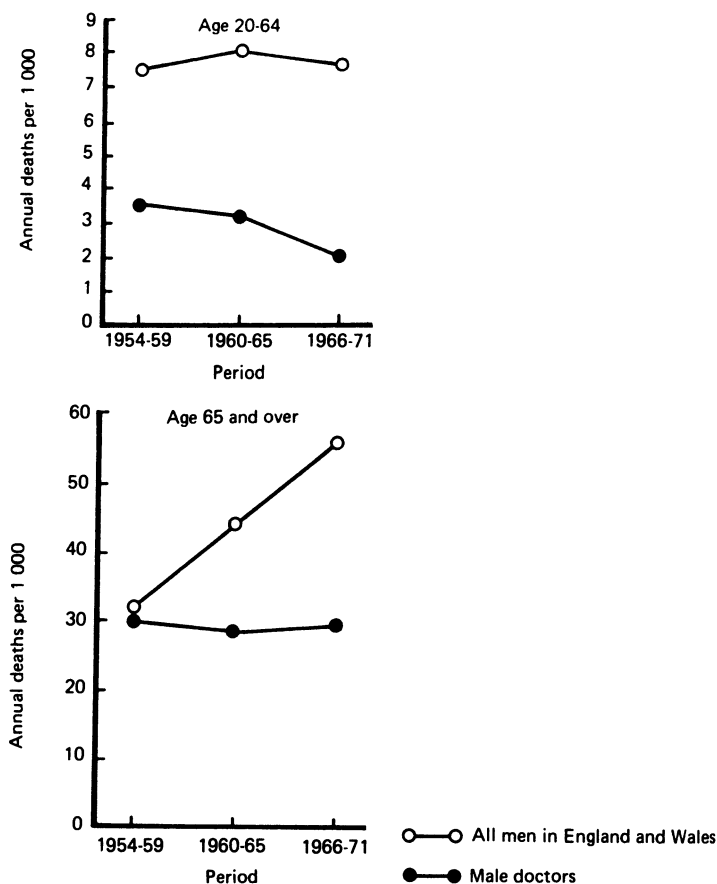
Each of the phases of health education is very complex and much is



**Figure 3.2** Average daily cigarette consumption by male doctors and all men, 1951-1971, in two age groups. Source: Royal College of Physicians Report (1977). *Smoking or Health*. (Tunbridge Wells, Kent: Pitman Medical)

still unknown. The supplying of information to increase an individual's knowledge about a particular health risk is not a straightforward proposition which can be embarked on without careful research. The source of the information is important: more credence is usually given if a message comes from a member of the health professions than a lay person or government spokesman. In this context, the cynical observation, attributed to a member of the tobacco industry, that a doctor or nurse who smokes is worth £50 000 to them, is of particular relevance. Aside from the source of the health education message, the means by which it is transmitted is also important. There is little place, for example, for a haughty medical expert talking down to the unhealthy 'sinners'.

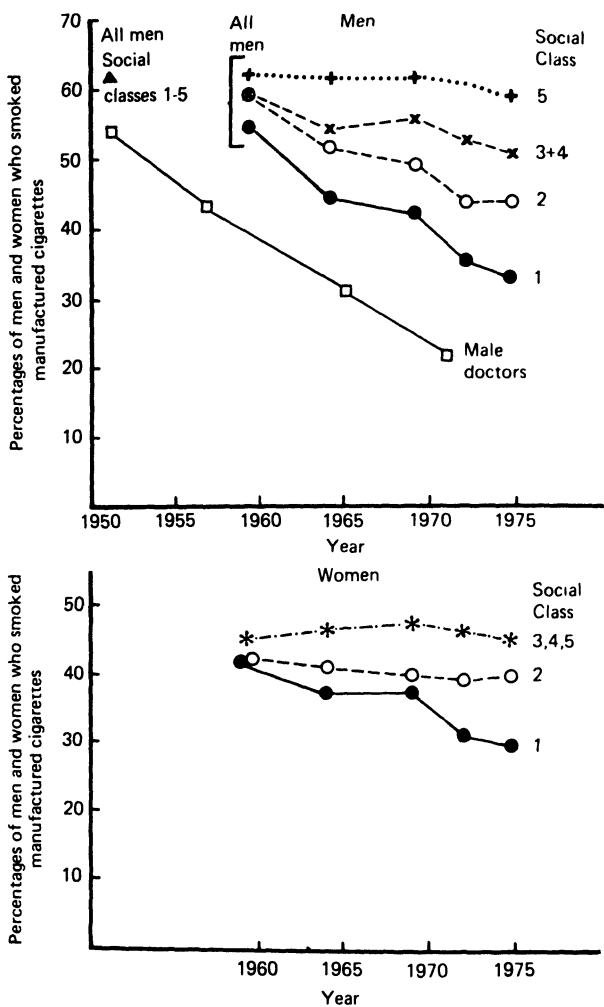
The process by which attitudes are changed is one which has stimulated a great deal of research, particularly by social psychologists. It has been suggested, for instance, that a change in attitude (resulting in consequent health behaviour) will occur only if the individual's perception of the benefits of the action (in terms of the seriousness of the disease and his susceptibility to it) outweigh his perception of the barriers to his taking this action. Any individual's belief system is likely



**Figure 3.3** Death rate from lung cancer in male British doctors and in all men in England and Wales, 1954–1971. Source: Royal College of Physicians Report (1977). *Smoking or Health*. (Tunbridge Wells, Kent: Pitman Medical)

to result from a vast complexity of factors, which may be cultural, social, familial, formally educational or experiential. Health education must attempt to come to grips with these issues if the process of enlightenment is to be successful.

One fundamental approach which provides long-term strategy for health education is to incorporate its health-related messages into a person's value system as it is developing during primary socialization. Children are born with certain basic patterns of behaviour that are



**Figure 3.4** Percentage of men and women who were smokers of manufactured cigarettes by social class, 1958–1975. Source: Royal College of Physicians Report (1977). *Smoking or Health*. (Tunbridge Wells, Kent: Pitman Medical)

genetically determined. However, during early life they learn skills, attitudes and values which determine how they will function and interact with other members of society. This process of socialization is not carried out by parents exclusively, although the family clearly is the central agent in it. A number of other influences directly affect the process: school, peer groups, churches, youth organizations and the

mass media. The potential for health education to inculcate its messages as part of this process of socialization is clearly enormous, since by this means, attitudes to health and health-related behaviour are established from a very early age.

### *Delivering health education*

Health education is, or should be, part of the role of many people both within and outside the health service: parents, schoolteachers, voluntary workers, nurses, social workers, doctors, health visitors, broadcasters and journalists. It is the full-time occupation of health education officers employed by health authorities.

*National and local organizations.* At the national level in England, in addition to policy formulated by Department of Health (which may incorporate the health education component), the main agency responsible for health education is the Health Education Authority. Its members are appointed by the Secretary of State for Health, and it receives financial support from central government. Its purpose is to lead and support the promotion of health in England, and its broad aims are:

- (a) To increase knowledge and understanding in society of the factors which contribute to health and disease.
- (b) To increase knowledge and understanding of how health might be promoted and disease prevented.
- (c) To influence individuals and organisations to take whatever steps lie within their power to improve health and reduce disease.

This national organization works closely with the health education services at a local level. When the National Health Service underwent its first re-organization in 1974, Area Health Authorities were charged with the responsibility of appointing Area Health Education Officers to organize a service for their population. The development of these services was slow, partly because of shortage of funds, partly because of lack of suitable training schemes to provide an adequate career structure in health education and partly, it must be admitted, because health education was, once again, accorded a low priority compared with other services. Since 1982 health education has become the responsibility of district health authorities.

In addition to the activities of full-time health education officers, much of the work of health visitors, community physicians, general practitioners and social workers involves health education, although it is difficult to quantify the amount of their time that is spent on such tasks.

**Table 3.4 Tobacco and alcohol: spending on advertising and health education**

	<i>Advertising by industry</i>	<i>Health Education Council</i>
Tobacco	£70 m	£0.5 m
Drinks	£36 m	£0.5 m

Source: Data cited in Kennedy, I. (1981). *The Unmasking of Medicine*. (London: Allen and Unwin)

*Strategies of health education.* A major opportunity for health education open to the health professional is that afforded by direct personal contact with people seeking help. For example, the health visitor may persuade the nursing mother of the benefits of continuing breast feeding in spite of difficulties she might be experiencing, or she may advise her elderly patient on the construction of a more balanced diet. Health education at a personal level in such professional-client interactions can be extremely effective. This is particularly the case if the client feels he has a need for help and advice and in such circumstances may be more ready to listen and learn.

Yet another traditional form of health education is that which is carried out in groups. Perhaps a good example are the regular discussion sessions held by health visitors and midwives for expectant mothers. Finally, much of the energy of health education is directed at influencing health-related behaviour through the impact of the mass media. Posters, television, radio or newspaper advertisements have all been used to reach out to the widest possible audience, for most of whom it represents the only means of contact.

The limited resources available to health education, however, are often insufficient to compete with promoters of harmful products, as is illustrated in Table 3.4.

*Health education in schools.* Health education in some form has been taught in schools for many years, albeit often unwittingly as 'cleanliness'. Indeed health education need not necessarily be a separate subject but an intrinsic part of many, such as biology, domestic science, home economics, history and geography (the so-called 'hidden curriculum'). Schools have traditionally been responsible for drawing up their own curricula and if they wish to ignore health education they may do so. Hence, the amount of time devoted to health education varies. Health education has never been a separate subject in public examinations for school children. Doctors, dentists and nurses from the school health service give practical help and advice on various health topics. Health education is part of the syllabus for teacher

training. Not being a traditional subject, some teachers are unsure about the teaching methodology to be used. Problems also arise with health education in schools as elsewhere. For example, children who smoke tend to come from poorer families in which parents and other siblings smoke, and the situation is not helped when 28% of teachers smoke.

During the last few decades there have been a number of major reports on education which have made scant reference to health education, usually mentioning one aspect: sex education. However, in the late 1970s the Department of Education and Science urged local education authorities to ensure that health education had a proper place in the curriculum and produced a book, *Health Education in Schools* which contains much useful information, but with the important reservation that what was said should not be construed as implying government commitment to the provision of additional resources.

A recent suggestion for the promotion of health education in schools is the appointment of a teacher for each secondary school to act as a health education co-ordinator who would draw up an overall programme for health education and act as a point of contact with outside professionals such as doctors, health visitors, health education officers and social workers.

### *Evaluation of health education*

Resources for health education are small and they must therefore be used wisely. This means that every health education programme should seek to evaluate itself: in other words, to determine how successful it has been in achieving its declared objectives. Steps forward will only be made by building on scientifically established foundations.

It cannot be assumed, for example, that a television commercial is effective merely because it has been shown at peak viewing time. Advertising agencies would never make such an assumption and they are concerned with making much smaller impacts: a move in the market 2-3% in favour of a particular soap powder represents huge profits for its manufacturer, but in health terms such a small shift in opinion would make less difference.

However, it would be wrong to draw too close a parallel with commercial selling. Health education involves explaining statistical probabilities and often entails persuading people to give up something they find pleasant, or to do something they do not particularly like.

There is evidence to suggest that the mass media tend to reinforce existing beliefs, for example, a programme on the problems of alcoholism could be neutralized by a subsequent popular programme which showed alcohol drinking as a socially acceptable practice.

Studies to evaluate health education usually employ one of two methods. Some are designed to record knowledge, attitude and health behaviour of a sample of the target population before and after the health education campaign. The success or otherwise is judged on the degree of change which has taken place. Another approach is to have a health education programme for a population and compare the results with a control population with similar characteristics, but which has not been exposed to the programme (experiment/control method).

Evaluative studies in health education are not numerous and the results of many have been disappointing. It is important to keep in mind, when assessing the value of health education, that most of the permanent changes in knowledge, attitude and health behaviour occur over a period of years rather than weeks or months.

Apparent failures of health education are sometimes presented in evaluative studies when an inappropriate outcome measure is used. For example, if the subject being evaluated is dental health education, using the experiment/control method, it would be incorrect to judge the experiment as a failure purely because there was no reduction in the number of children with dental caries amongst the target population as compared with controls. The correct initial outcome measure is the degree of achievement of the educational and behavioural goals aimed at by the programme. Whether or not such health education measures result in the reduction of dental caries in the long-term is a different issue. It is governed not only by whether the population adopt the desired behaviour (e.g. better dental hygiene and correct eating habits), but also the extent to which it is in fact proven to be healthier; in this example, whether scientific study has shown that individuals adopting the measures have significantly lower levels of tooth decay.

### **Legislation and social-policy change**

Measures such as health education directed at the individual in order to persuade him to make a definite choice to change his behaviour may be supplemented by preventive strategies designed to limit his choice to pursue unhealthy courses of action. Such strategies, which are the result of central policy decisions, may be grouped under three broad headings:

#### **(1) *Compulsion***

The question of using legislative means to secure preventive health goals is one which often provides bitter controversy. The counter argument usually hangs on the immorality of removing the individual's freedom to choose and the alleged harmful effects of the health legislative measure. The relationship between the State and the individual as expressed in law is a major theme in political philosophy. Although



much has been written since, the major reference is still an essay published in 1859 entitled 'On Liberty' by the British philosopher, economist and author John Stuart Mill (1806-1873), and generally regarded as his masterpiece. In it he states that

the only purpose for which power can rightfully be exercised over any member of a civilised society is to prevent harm to others. His own good, either physical or moral, is not a sufficient warrant.

Measures which prevent the spread of disease are accepted without question, for example, legislation to ensure adequate standards of hygiene by food producers and handlers, or to maintain a pure water supply. Other proposals which affect individual freedom such as the wearing of seat belts, or restriction on smoking, cause controversy.

Another example of the use of the argument about individual liberty concerns fluoridation of drinking water. This measure is well researched and is safe and effective in preventing dental caries.

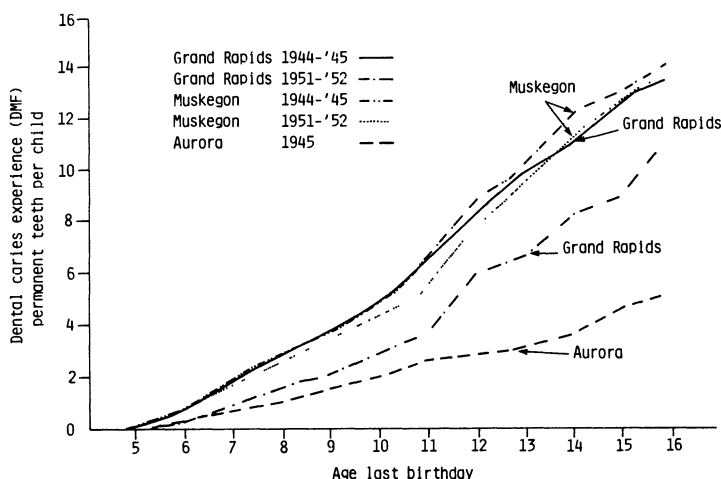
*Dental caries and fluoridation of the water supply.* Dental caries (tooth decay) is one of the most commonly occurring chronic diseases, resulting from disease of the enamel of the tooth which gradually erodes the dentine and ultimately, if untreated, the pulp of the tooth. The underlying cause of the disease is a combination of bacterial action and the presence in the diet of refined carbohydrates. It results in the pain, discomfort and mild disfigurement which are regarded by most people as a fact of life; indeed, few people are spared its effects, at least to some degree. By the age of 5 years 75% of children have some caries and by the age of 15 years that figure is 97%; in 1968, 37% of people over the age of 16 years had had all their teeth extracted.

A substantial amount of NHS resources is committed to the treatment of dental caries. The traditional approach to prevention depends on the individual: the careful and efficient brushing of teeth to remove bacterial plaque can, to some extent, prevent the onset of decay. Standards of oral hygiene are, however, generally poor and it has proved difficult to raise them by means of health education.

An alternative approach – that of boosting the resistance of the enamel of the tooth to attack – was evolved through an observation made by a young dentist, Frederick McKay, in Colorado Springs, USA in the early part of this century. McKay noted that amongst inhabitants of this town and certain other areas there was often present a curious mottling of the enamel of the teeth. This was later found to be caused by an unusually high level of naturally occurring fluoride in the drinking water of these places, which caused no ill-effects aside from the teeth-staining. During the course of the further investigation (by others, including notably another American, Trendley Dean) of the

phenomenon of tooth-mottling or 'fluorosis' as it became known, it was discovered that those places having a high level of naturally occurring fluoride had a much lower prevalence of dental caries amongst children than in low-fluoride areas. From the findings of these studies, it was reasoned that it might be possible, by adding fluoride to the water supply in areas with low levels of naturally occurring fluoride, to prevent a large proportion of dental caries without reaching the threshold for the production of fluorosis or tooth-mottling.

An experiment was carried out in Michigan, USA in 1945 to test this hypothesis. Two towns with similar baseline caries levels were chosen. To the water supply of one (Grand Rapids) sufficient fluoride was added to raise its concentration to 1 ppm. To the other low-fluoride town (Muskegon), no such addition was made. Children in both towns were followed up with regular dental examination for six and a half years. A third town (Aurora) was chosen in which the naturally-occurring level of fluoride in the water was 1.2 ppm, and hence was slightly greater than the level artificially produced in Grand Rapids. The results of the study are shown in Figure 3.5 and demonstrate a reduction in the dental caries experience in Grand Rapids children which varied from 66% in 6-year-olds to 18% in 16-year-olds. Similar reductions were not observed in Muskegon; moreover, the Grand Rapids experience was close to that of the naturally high fluoride town



**Figure 3.5** The results of a study of the effect of fluoride on the dental caries experience of schoolchildren in three communities. Source: Arnold, F.A., Dean, H. T. and Knutson, J. W. (1953). Effect of fluoridated public water supplies on dental caries prevalence. *Public Health Rep.*, **68**, 141-148

(Aurora). Further studies in America, Britain and other countries have repeatedly demonstrated this beneficial effect of fluoride. This amounts to a reduction of about 50% in the prevalence of caries for children who drink the fluoridated water during the years of tooth formation and the effects are life-long. In spite of these findings, fluoride is added to the water supply in only some countries of the world. In Britain it still has not been introduced in the majority of areas.

Decisions on whether to fluoridate are made at a local level and this is where effective opposition by pressure groups is often mounted. The principal arguments against fluoridation are:

- (a) it infringes personal freedom ('compulsory medication');
- (b) it is harmful, causing (it is variously alleged) cancer, heart disease and congenital malformations;
- (c) other equally effective ways of administering fluoride are available.

The first argument is held up as a moral and ethical one, but the decision is usually taken on political grounds. It should be remembered that fluoride occurs naturally in many water supplies in much higher levels than those recommended for addition. Moreover, many other substances are added artificially to the water to render it safe and there are no objections raised to these.

The second argument is not supported by the evidence, which shows no deleterious effects or excess mortality or morbidity due to fluoride in the water either at the recommended level or even higher.

The final argument relates to the use of fluoride tablets, fluoride toothpastes or other topical measures. Such measures depend on the user adhering to the prophylactic and even if they were equally effective it is unlikely success would be achieved with this measure on a population basis.

Fluoridation of the water supply (or lack of it) is a good demonstration of how, in spite of overwhelming scientific evidence of a safe and effective health measure, a vociferous minority with emotional arguments can weaken the will of politicians and others to act.

## *(2) Limiting options*

In addition to measures which seek to prohibit or enforce a particular action, another approach which may or may not involve legislation, is to attempt to channel an individual into a particular action. The consumer's choice may be influenced by economic means: increasing taxation on cigarettes and alcohol or by subsidizing products thought to be beneficial, like polyunsaturated fats or wholemeal bread.

Other approaches seek to limit choice other than by economic

pressures. Examples are licensing hours for public houses and the restriction of smoking in public places.

The introduction of such measures can result in complex reactions, so they need to be carefully monitored to see if they produce the desired effects. There is evidence to support the approach of increasing the price of alcohol in order to achieve reduction in consumption. On the other hand, if the price is too high it could encourage people to make alcoholic drinks at home.

### (3) *Changing the environment*

Another way in which policy changes can influence the health of the individual and the community is by action taken to adjust the environment in which he lives. For example, measures which control atmospheric pollution and noise levels, limit the effect of radiation and other environmental hazards contained within a legal framework (see Chapter 10).

## **Screening**

### *Types of screening*

In its widest sense the term 'screening' implies the scrutiny of people in order to detect the presence of disease, disability or some other attribute which is under study. There are a number of kinds of screening, each of which is carried out for a particular purpose. These can be summarized as follows:

*Protection of the public health.* This type of screening has its origins in the traditions of public health and the control of infectious diseases. For example, people entering a country are often subjected to tests or examinations designed to detect the presence of infectious diseases or a carrier state. An immigrant in this category would be judged as a potential risk to the indigenous population and might be refused admission altogether or only admitted after appropriate treatment. Mass chest radiography was originally introduced in this country to identify cases of tuberculosis which could then be isolated from the rest of the population.

*Prior to entering an organization.* It is now a universal requirement that all potential recruits to the armed forces should undergo screening by medical examination. This practice dates from the time of the Boer War when a similar screening exercise revealed the high levels of ill-health which so shocked the government and was one of the stimuli to the establishment of the school health service (see Chapter 6). In addition to the armed forces, industry also may use the medical

examination as a screening tool in the pre-employment context. In some cases this may also serve to protect the public (for example, in the case of airline pilots or train drivers), but its essential purpose is to the benefit of the organization so that it recruits a healthy workforce.

*Protection of workforce.* In addition to the pre-employment medical which is compulsory in certain occupations, many industries have a statutory obligation to screen their workforce. This is usually for the protection of workers in industries which have a high risk of disease due to hazards in the working environment, e.g. nuclear radiation.

*For life insurance purposes.* Most life insurance companies screen prospective policy holders, either by a questionnaire about their health or by direct medical examination. Their aim in so doing is to allow them to load the policy against high-risk clients.

*The early diagnosis of disease.* This form of screening, often called 'prescriptive screening', is concerned with the detection of disease in its early stages so that early treatment for that disease may be started. This course of action may not be justified as is discussed in the remainder of this section, which is concerned with screening only in the context of early disease detection.

### *Early disease detection*

Modern medicine deals with a different range of disorders from its counterpart at the turn of the century. Then, the important diseases were the infectious ones from which mortality rates were high. Also, as explained elsewhere in this book, present day Western society with its ageing population is no longer confronted with these problems, which declined in importance with the advent of the great sanitary reforms and improvements in nutrition and general living standards. Instead, the doctor is faced with chronic degenerative disorders like coronary heart disease, stroke, bronchitis, cancer, arthritis and mental illness, often in their late stages, where the emphasis is necessarily on 'care' rather than 'cure'.

Faced with this prospect there are two approaches to advancement. Firstly, to prevent these diseases from ever occurring (primary prevention), and secondly, to develop more effective treatment and 'cure' the established disease (secondary prevention). These two alternatives are daunting propositions and thus a third strategy would seem to have appeal: to diagnose disease in its early stage, the argument being that early diagnosis would lead to more effective treatment and a greater cure rate. On this reasoning, presymptomatic screening for

disease appears to be a logical extension of clinical practice. This argument, coupled with the fact that many population surveys showed a high frequency of previously unrecognized abnormalities, led in the early 1960s to the advocacy of presymptomatic screening for disease on a large scale<sup>3</sup>. These endeavours attracted widespread interest from both the public and the mass media at the time.

Such was the vehemence of the argument in favour of this course of action that a bandwagon effect developed. Rather like the discipline which Koch's postulates imposed on the establishment of causal links between bacteria and disease, a similar set of considerations was laid down in the context of screening. Instead of a wholesale shift over to early disease detection amongst the population, a number of questions were formulated to be addressed before embarking on such a programme for any disease<sup>4</sup>. Included amongst these were:

*Is the disease an important health problem?* Before channelling resources on a large scale the problem must be deemed to be a serious one. Nevertheless, 'importance' is, of course, a relative concept. Some health problems may be 'important' because they are very common, others although rare may have serious consequences for the individual or Society as a whole.

*Is there a recognizable latent or early symptomatic stage?* In order to detect a disease in its early stages there must be a reasonable time period during its natural history when symptoms are not manifesting themselves.

*Are facilities for diagnosis and treatment available?* If a screening programme were to reveal such large numbers of patients with a particular disease that existing facilities could not cope with the workload this, clearly, would be completely unsatisfactory.

*Has the cost of the programme been considered in the context of other demands for resources?* At no time in the foreseeable future are there likely to be unlimited resources that would permit every proposal to be followed through. Proposed expenditure on any one health option must, therefore, be weighed against other proposals.

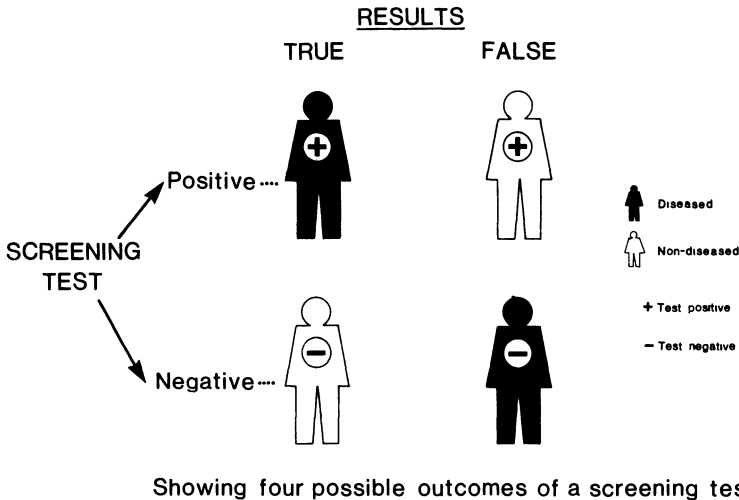
*Is there an agreed policy on whom to treat as patients?* This brings in the question of borderline cases: in any population disease exists in a spectrum of severity. At the less severe end of the spectrum there is a problem of differentiating people with the disease from normal people. Strict criteria must be laid down, therefore, about what constitutes the particular disease, before screening is carried out.

*Does treatment confer benefit?* This is perhaps the most important consideration of all and it raises fundamental ethical principles. The presymptomatic screening of people for the presence of disease differs from normal medical practice. In the usual situation the patient makes contact with a doctor because he has recognized that he is ill and in need of medical care. The doctor attempts to formulate a diagnosis and give the best treatment available to the patient, based on his experience and current medical knowledge. In the screening situation the 'patient' has not recognized that he is ill. In fact he probably believes himself to be healthy. The doctor (or screener), in offering him the opportunity to be screened, implies that a health benefit will result, i.e. the early treatment of the disease (if present) and a favourable outcome. The reality is that in few diseases is there any convincing evidence that striving for early diagnosis on a total population basis and hence early treatment affects the outcome for the patient. Thus, it is essential, before embarking on a screening programme for a particular disease, to review all the evidence and decide whether early diagnosis and treatment will truly benefit the person being screened; or whether, on the other hand, he could be spared the anxiety of the early knowledge that he has developed the disease, until such time as the condition manifests itself clinically.

### *Choosing the screening test*

Having decided to embark on a programme to screen for the presence of a particular disease in a population, the next issue centres on which test to choose for the purpose. Usually those proposing to carry out the screening will have a particular method in mind for detecting the disease, whether it is a blood test, a urine test, an examination or a questionnaire. When making the choice, however, a number of general criteria should be borne in mind. The test should be *cheap* and one that can be carried out *rapidly* by trained non-medical personnel. It should be *acceptable* to the majority of people and this usually rules out very painful or time-consuming procedures. The test should be *reliable*; in other words, the same result would be expected if it was repeated by a different observer altogether or by the same observer on a number of occasions. Finally, and most importantly, the *validity* of the test must be known. By validity is meant the test's ability to measure or discover what the investigator wants to know. How good is the test at discriminating between people who have the disease and people who are healthy? Validity is usually expressed in terms of *sensitivity* and *specificity*. Applying a screening test to a population may divide people into four possible types (Figure 3.6). Firstly, there may be people who have the disease and give a positive result on screening (*true positives*); secondly, people who are healthy, or non-

diseased, and give a negative result on screening (*true negatives*). If a screening test was ideal, these are the only categories of people who would exist. No test is perfect, however, and because of this two further categories are possible: (1) people who, despite having the disease, are classified as healthy by the screening test (*false negatives*) and (2) healthy people who are classified by the screening test as diseased (*false positives*).

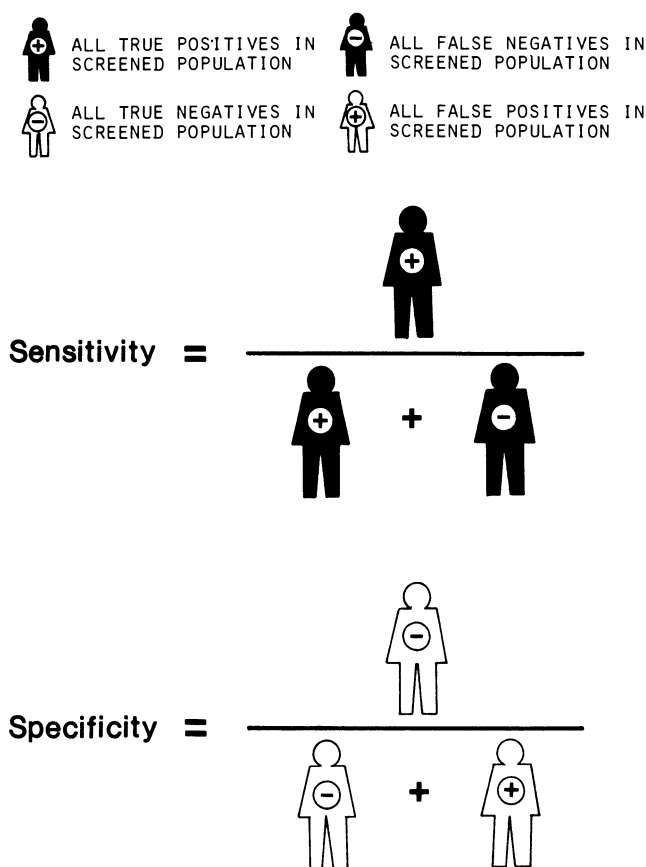


**Figure 3.6** Four possible outcomes of a screening test

The concepts of sensitivity and specificity take account of these problems (Figure 3.7). The sensitivity of the test is a measure of its ability to detect the disease when present. A very highly sensitive test would have no or very few missed cases (*false negatives*).

The specificity of the test is a measure of its ability to identify 'healthy' people as non-diseased. A test of high specificity would have no or few people wrongly labelled as diseased (*false positives*). It is seldom possible to have a test which is 100% sensitive and 100% specific: usually a compromise level must be agreed. Figure 3.8 shows diagrammatically different levels of sensitivity and specificity. Clearly, a level of 60% would never be acceptable; a level of 90% might possibly be, depending on the diseases in question, but a higher level than this would usually be sought. In making a decision on what levels of sensitivity and specificity will be accepted, the practical implications of the choice must be realized. A sensitivity below 100% means that some

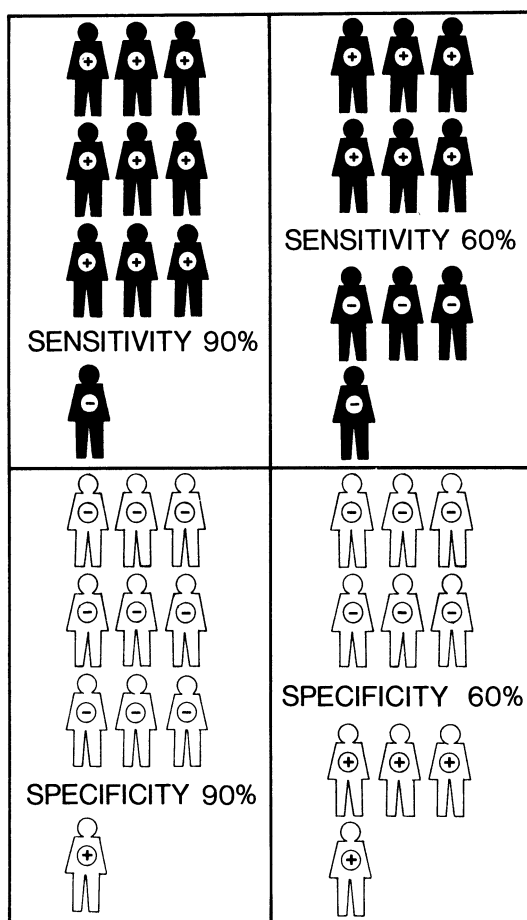




**Figure 3.7** Results of a screening test showing sensitivity and specificity

people with the disease will be missed and the consequences of this depend on the particular disease concerned. A specificity below 100% means that some healthy people will be told that they might have the disease, with the ensuing anxiety that might result from this. It is important to stress that screening tests cannot be regarded as diagnostic and those people with positive results must undergo further examination and investigation to establish a definitive diagnosis. Some of the practical implications of mounting a population screening programme for a particular problem are discussed in the context of neural tube defects (see Chapter 6).

The question of the validity of a screening test, as expressed in sensitivity and specificity, is thus an extremely important issue. A



**Figure 3.8** Differing levels of sensitivity and specificity of screening tests

knowledge of these principles is, however, of value far beyond the arena of screening. Great benefit would result to the patient, to the standard of medical practice and to the health service, if such a scientific approach were taken to many of the diagnostic tests and examinations in common use today.

For example, if we are told that duodenal ulcer is diagnosed by barium meal we might not accept that at face value without asking 'how good is barium meal at diagnosing duodenal ulcer? . . . how does it compare with other diagnostic techniques? . . . how many cases of

duodenal ulcer do I fail to identify if I only investigate them by doing a barium meal?' etc.

### *Some screening tests in use*

A whole population may be screened for the presence of a particular disease (mass screening) or the approach may be restricted to sub-groups known to be at particular risk from the disease (selective screening).

Many screening tests are already a firmly established part of everyday medical practice. Most of them were introduced at a time when new proposals were not subjected to rigid scrutiny. Screening for cervical cancer, for example, was introduced because it was thought to be, inherently, a good thing if this killing disease were to be detected and treated before it should reach an advanced stage. The modern view is that new screening programmes should be introduced only after they have been properly evaluated. This usually means a randomized controlled trial, when the outcome for people who have been screened is compared with that for a similar group who have not. Thus it can be determined whether intervention by screening is any better than the conventional method of managing the disease. Such an approach has been used in considering the case for breast-cancer screening and is further discussed in Chapter 2.

Clearly it would be unrealistic as well as unethical when a screening programme is well-established (and perhaps of benefit), to begin again and withhold screening from some individuals in order to carry out an evaluation. In the absence of this option, attempts to justify existing screening programmes have used other attempts at evaluation. A common method is to compare the health of people accepting or coming forward for screening with those not taking up the service or rejecting it. This is a classical pitfall for the unwary. People who refuse or do not present for medical care are usually less healthy than those who do. Returning to the example of cervical cancer screening, the disease is known to be more frequent in the lower social classes than the upper. Yet (see Table 4.7, Chapter 4), those people coming forward for screening are predominantly in the upper social classes (the people who least need the service). A comparison of 'screened' with 'unscreened' in these circumstances would indicate less disease in the screened group simply because of their class composition, irrespective of whether screening was effective or not.

Some examples of screening tests in common use are shown in Table 3.5. They have found a definite place in medical practice and are likely to remain there for some time to come. There can be no argument about the value of establishing the presence of serious congenital abnormalities (such as congenital heart defects or congenital dislocations

**Table 3.5 Examples of screening programmes in common use**

<i>Group screened</i>	<i>Disease or abnormality detected</i>	<i>Test and by whom carried out</i>	<i>Aim</i>
Neonates	Structural abnormalities (e.g. congenital heart disease, spina bifida, congenital dislocation of the hip) Functional abnormalities (e.g. cerebral palsy, visual and hearing defects)	Physical examination by doctor/midwife/health visitor  Physical examination by doctor/midwife/health visitor	Prevention of death or handicap by early correction  Prevention of handicap or educational impairment by early treatment
Pregnant women	Metabolic disease (e.g. phenylketonuria)  Adverse factors in pregnancy (e.g. anaemia, raised blood pressure, proteinuria) Fetal abnormalities (e.g. neural tube defects, mongolism)	Special test (e.g. Guthrie test) by midwife/health visitor  History taking/physical examination/special tests by doctor/midwife Serum or amniotic fluid test	Prevention of handicap by dietary modification  Prevention of death or disability in mother or fetus Prevention of birth of abnormal or handicapped fetus by offering abortion
Middle-aged men and women	Hypertension  Cervical cancer  Breast cancer	Blood pressure reading by doctor/nurse Papnicolaou smear by doctor  Self examination (by patient) palpation, X-ray mammography, thermography by medical or technical staff	To prevent premature death or disability from complications To prolong survival from the disease To prolong survival from the disease
Elderly people	Disease, disability or social isolation	General practitioner or health visitor making regular visits/examinations	To delay onset of dependency

of the hip) by screening all new-born children by physical examination. Effective surgical procedures exist to deal with such disorders which, if left untreated, can cause serious disability and even death. Similarly, the screening of children for sensory abnormalities such as deafness is fully justified. Left untreated, it can result in retardation of speech development, social handicap and poor educational achievement. Critical appraisal of this type of screening programme revolves around other questions such as the choice of the most appropriate method and the best time at which to carry it out.

**Table 3.6 A schedule of immunization for children in Britain**

<i>Age</i>	<i>Vaccine</i>
3 months	Diphtheria/tetanus/pertussis (triple vaccine) Oral polio vaccine
4½–5 months	Diphtheria/tetanus/pertussis (triple vaccine) Oral polio vaccine
9–11 months	Diphtheria/tetanus/pertussis (triple vaccine) Oral polio vaccine
12–18 months	Measles, mumps and rubella (MMR)
At 5 years of age or school entry	Diphtheria, tetanus, oral polio vaccine MMR, if not previously given
10–14 years	BCG vaccine
10–14 years (girls)	Rubella vaccine
15–18 years or on leaving school	Tetanus Oral polio vaccine

Note: Approximately 50% of notified cases of measles are in school children. Previous history of measles should not be regarded as contra-indication as the diagnosis is often incorrect.

Screening programmes for detecting disease in later life are more controversial, however. The issue of cervical cancer screening has already been raised. Similar doubts surround the question of introducing screening programmes for hypertension and breast cancer on a widespread population basis, rather than leaving case-finding to individual doctors.

### **Immunization**

The control of infectious disease requires many measures: improvements in social conditions, isolation of sufferers from the disease and

attacks on the source and means of transmission of the infection. In addition, an important part is played by immunization of the host in order to decrease his susceptibility to the infection. Prevention of disease by increasing the resistance of the host is at present, mainly restricted to the infectious diseases, although it is conceivable that, in the future, advances in medical knowledge will allow comparable measures to be employed in some of the chronic diseases.

The terms 'vaccination' and 'immunization' are often used synonymously. The current convention is to refer to the substances as vaccines and to the process (administering the vaccine) as immunization. A schedule for routine immunization of children is given in Table 3.6.

### *The nature of immunity*

The word 'immunity' as it is loosely used, is usually taken to mean the capacity of a person to resist developing an illness when he is subjected to the particular causal agent, usually a micro-organism. The human body possesses a remarkable natural defence mechanism – the immune system, the complexity of which is as yet only partly understood. The essence of the immune system is its ability to recognize substances (antigens) which are 'foreign' or do not belong to the body. Such antigens may be, for example, bacteria, viruses or cells in, say, a skin or kidney graft originating from another person. When the antigen comes into contact with the body it can provoke one of two sorts of reaction from the immune system.

(a) *Humoral immunity.* This is the type of immune response involved in many infectious diseases. A specific antibody is manufactured and released into the blood stream where it combines with the antigen to aid its destruction. It is a cardinal principle, that antibodies on a future occasion will, in general, only respond to the specific antigens that stimulated their formation. Thus an attack of mumps confers immunity against further attacks by the mumps virus but not infection by the chickenpox virus.

(b) *Cell-mediated immunity.* This is the form of immune reaction which results in the rejection of foreign skin or organ grafts, sensitizes the skin to tuberculin in people who have been exposed to the tubercle bacillus (Mantoux or Heaf tests) and is important in combating certain viral or fungal infections. It results from the production of special cells, in response to the antigen, which instead of releasing an antibody into the blood stream, retain it on the surface and attack the foreign material directly.

*Non-specific immunity*

In addition to these specific immune processes the body also has other non-specific defence mechanisms which allow individuals to resist infection to a degree which varies according to factors such as genetic make-up, age or general nutritional status.

*Production of immunity*

Specific immunity to infection may be classified as follows:

(1) *Passive immunity*. Protection of a temporary or short-term nature may be provided by the transfer of antibodies:

- (a) Naturally acquired passive immunity is the transfer of certain antibodies from mother to the fetus via the placenta or in breast milk so that the infant is protected from certain diseases (such as chickenpox, mumps, measles) for the first few weeks and months of life.
- (b) Artificially acquired passive immunity can be produced in the following ways:
  - (i) Antibodies may be obtained against certain diseases by pooling plasma from donors, many of whom will necessarily have been exposed to the infection. Administered in this form, gamma globulin or human immunoglobulin can provide short-term protection to especially susceptible individuals or when travelling to an endemic area.
  - (ii) An older method of artificial passive immunity is the raising of antibodies in the sera of animals such as horses. An example is the antitoxins to (neutralize) tetanus toxin or diphtheria toxin which are produced by a series of injections of toxoid into the animals. Tetanus antitoxin may then be used immediately in a case where a wound is heavily contaminated with dirt, to provide immediate but temporary protection. A drawback to the use of antitoxins is their tendency to cause serious sensitivity reactions in some individuals due to foreign proteins.

(2) *Active immunity*. This is a more permanent form of immunity which is developed in the body:

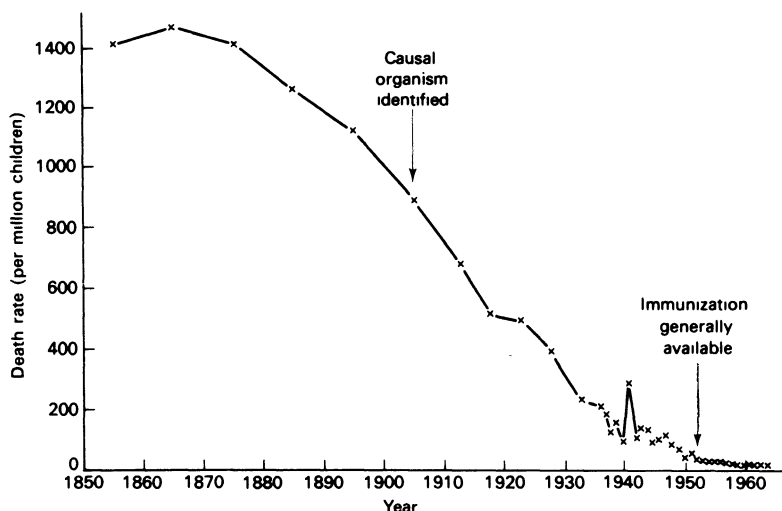
- (a) Naturally acquired active immunity results from clinical or sub-clinical (asymptomatic) infection with the disease.
- (b) Artificially acquired active immunity is deliberately induced by immunization (to produce immunity without overt infection).

Such immunization may be carried out by the injection of:

- (i) Killed or inactivated organisms (e.g. whooping cough, cholera, rabies, typhoid).
- (ii) Living organisms whose virulence has been diminished or attenuated (e.g. smallpox, rubella, measles, tuberculosis).
- (iii) Bacterial toxin made harmless (toxoid) to stimulate the formation of antitoxin in the person's blood stream (e.g. diphtheria, tetanus).

### *Review of vaccines in current use*

**Whooping cough.** Mortality from this disease has gradually declined since towards the end of the last century, a decline which preceded the introduction of immunization (Figure 3.9). Immunization may have played a part, however, in lowering the incidence of the disease and reducing its severity. The evidence for this largely depends on the interpretation of trends in notification, themselves an unreliable source of data because of the tendency to under-report the disease. The vaccine, a preparation of killed *Bordetella pertussis* organism, is usually administered along with diphtheria and tetanus toxoid (triple vaccine) in spaced doses during the first year of life. The greatest controversy,



**Figure 3.9** Whooping cough: decline in death rate of children under 15, England and Wales, 1850–1960. Source: McKeown, T. (1976). *The Modern Rise of Population*. (London: Edward Arnold)



however, surrounds the hazards of whooping cough immunization. These range from screaming attacks to encephalopathy, or brain damage. These disturbing features, together with the medical debate about efficacy of the vaccine, have led some medical observers to call into question the continued use of the vaccine. Certainly the publicity which has arisen out of legal action by the parents of alleged vaccine-damaged children has contributed to the fall-off in uptake of whooping cough immunization from 80% in 1974 to 31% in 1978. It has also affected the uptake of immunization programmes in general by parents on behalf of their children.

There is good evidence that before 1969 the British vaccine was relatively ineffective and contained less international units of killed *Bordetella pertussis* than recommended by the WHO. In addition, during the 1960s new sero-types of the organism caused infection in the community and these were not included in the vaccine. A new, more effective absorbed vaccine came into use in 1969 and gave a high degree of protection as evidenced by the low rate of pertussis where the uptake rate of the vaccine was high.

However, this passed unnoticed by the general public, who paid much more attention to the controversy surrounding the hazards of whooping cough immunization which were widely publicized in the media. In Britain and Sweden from the 1960s a number of reports suggested that adverse reaction to pertussis vaccination of a severe degree occurred. There were a number of estimates of the frequency and commonly quoted was 1 in 50 000. The reactions reported varied in severity from screaming and pallor, to collapse or convulsions, and in a minority of cases encephalopathy. The reader has already been alerted to the dangers of drawing conclusions from data which are retrospective, do not include suitable comparison groups and to the fact that a significant association does not imply causality. In addition, there is no *specific* neurological condition associated with the vaccine. In fact, neurological disorders in young children are not uncommon and estimates suggest that 5–7% of children have had one or more convulsions before the age of 7 years (most frequently between 6 months and 2 years). This produces a higher rate than would be expected following pertussis vaccination.

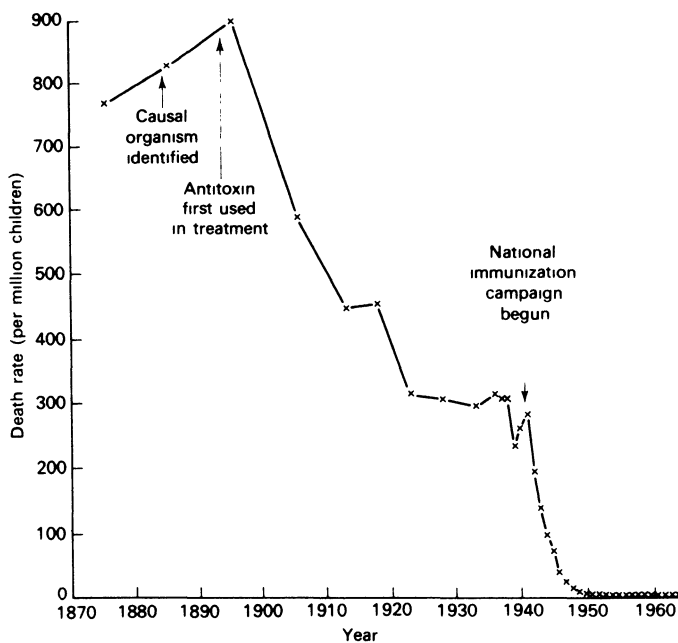
The National Childhood Encephalopathy study was set up in 1976 to consider the problem of the safety of the vaccine with particular reference to brain damage and has carried out a case-control analysis of children aged between 2 months and 3 years admitted to hospitals with defined conditions. A report on the first 1000 cases showed a significant association between serious neurological illnesses and pertussis vaccine, though there were only 35 cases and most children recovered completely<sup>5</sup>. No significant association was found between

serious neurological illness and preceding immunization with diphtheria and tetanus vaccine.

The estimated attributable risk (which is an estimate, not a precise measure) of serious neurological disorders occurring within 7 days after immunization with triple vaccine in previously normal children is 1 in 110 000 injections. The risk of neurological sequelae persistent one year later is 1 in 310 000 injections.

The Joint Committee on Vaccination and Immunization, which is the official advisory body, reviewed the evidence and considered that the risks of vaccination were slight and particularly so when contraindications to vaccination are observed. The risks need to be set against the dangers of the disease. They concluded that the current vaccine is protective, and in view of the fact that whooping cough is still a serious disease, that its use should be continued, commencing at three months of age.

**Diphtheria.** The decline in mortality from, and incidence of, this serious disease is in a large part due to the success of immunization (see Fig.



**Figure 3.10** Diphtheria: Decline in death rate of children under 15 in England and Wales, 1870–1960. Source: McKeown. T. (1976). *The Modern Rise of Population*. (London: Edward Arnold)

3.10). The modified diphtheria toxin (toxoid) is usually combined with an adjuvant to increase its antigenic properties and hence to give a greater antitoxin production. It is included as a component of triple vaccine (along with tetanus toxoid and pertussis vaccine). Three spaced doses are given during the first years of life and a booster at school entry. A high degree of protection against diphtheria is afforded by the toxoid, but fall off in uptake may have serious repercussions if outbreaks of diphtheria occur again.

To control the disease it is necessary to maintain a safe level of herd immunity (immunity level in the community). When the vaccine was introduced in the 1940s most adults were immune and it was estimated that it would require 70% of children immunized to eliminate the disease. For many years Britain has been virtually free of diphtheria and there is evidence that about half the population of young middle-aged adults are non-immune. It would appear, therefore, that the lower level of herd immunity is effective, possibly because of changed circumstances: better nutrition, improved environment and changes in the infective agent. In the present circumstances it would seem prudent to maintain a high level of immunity in infants.

*Tetanus.* This disease, which results from the contamination of wounds by spores of *Clostridium tetani* and subsequent production of a lethal neuro-toxin, is rare in Britain today but common in countries where hygienic standards are poor and cultural practices differ. Cases of tetanus do still occur and are a major tragedy, especially when it is appreciated that effective prophylaxis exists. Modified tetanus toxin (toxoid) combined with alum to enhance the production of antitoxin is given in combination with diphtheria toxin and whooping cough vaccine (triple vaccine) in the first year of life, as spaced doses.

Further boosters of tetanus toxoid are given at school entry and throughout adult life, particularly in high-risk groups (e.g. soldiers, sportsmen, agricultural workers). The efficacy of the toxoid was well demonstrated by the low levels of tetanus contracted amongst troops in the Second World War. It gives solid immunity for up to ten years.

Passive immunity is produced by administration of tetanus antitoxin (antitetanus serum) immediately when there is suspicion that a wound is contaminated or the person has not received recent immunization with toxoid. Serious side-effects can follow its administration, however, but these may be less of a problem now that the antitoxin is being raised from human rather than animal sources. Active immunization should be started at the same time.

*Poliomyelitis.* Paralytic poliomyelitis represents the severest end of a spectrum of infection by a virus which, in the majority of people,

results in a subclinical attack. Nevertheless, because of its serious disabling consequences, it is important to maintain a high level of immunity in the population. Since its post-war peak, notifications of poliomyelitis in England and Wales have gradually declined to their present very low levels, largely due to the success of the immunization programme introduced in the mid-1950s. The disease is, however, still endemic in many tropical countries from which the disease may be imported by travellers. For their own protection visitors to these countries should be immunized.

Live attenuated poliomyelitis vaccine (Sabin vaccine) is rapidly and conveniently administered in the form of drops, whether directly into the mouth or (commonly) on a sugar-lump. Protection given is over 90% and the vaccine is administered as spaced doses routinely in early childhood. Recently, sporadic cases of paralytic poliomyelitis have been attributed to vaccine strains of the virus. This has led in turn to the suggestion of a return to the older form of killed virus vaccines (Salk vaccine). Cases of vaccine-induced paralytic poliomyelitis, if they do occur, are exceedingly rare. An attempt to replace the oral vaccine with the Salk vaccine would probably lead to less effective protection.

*Measles.* This highly infectious disease is endemic in most parts of the world. It is usually regarded as a mild illness and whilst mortality from it is low today, complications such as secondary chest infection are serious and can lead to long-term disability. A live attenuated virus vaccine, given in the second year of life as a single dose, provides 95% protection. Serious side-effects such as convulsions and encephalitis are rare and certainly less common than those produced by the disease itself. Although uptake of the vaccination has recently risen to 68% (1985) this is well short of the level required to eradicate the disease. It seems that considerable education is needed of both the medical profession and the public to tarnish the benign image of measles so that it can be brought under control.

*Rubella.* A live attenuated virus is available for protection against rubella (German measles). The clinical disease is mild, but the purpose of immunization is to prevent infection with the virus during the early months of pregnancy when there is a risk of a malformed fetus (congenital rubella syndrome). An effective vaccine has been available in Britain since 1970. However, the policy of selective vaccination which operated until the introduction of the measles, mumps and rubella vaccine in 1988, failed to eliminate the congenital rubella syndrome.

*Measles, mumps and rubella vaccine (MMR).* When the rubella vaccine

was introduced in the UK in 1970, it was decided to limit the programme to pre-pubertal girls and non-immune women of child-bearing age. The objective was to protect women from developing rubella during pregnancy, and thus eliminate the congenital rubella syndrome (CRS). The objective of eliminating CRS was not achieved.

In 1986 and 87, 362 infections in pregnancy were confirmed by laboratories in England and Wales. Most of these pregnancies were terminated. There were approximately 20 cases of CRS occurring annually and probably ten times that number of terminations due to rubella infections.

In addition, in Manchester during the 1983/84 outbreak, 5% of parous women contracted rubella compared with only 1% of nulliparous women. This suggests that when rubella is present in the child population it is passed on from young children to pregnant mothers. Vaccination of teenage girls and women is therefore insufficient to prevent rubella in pregnancy. Thus young children must also be vaccinated.

Most other countries have adopted a policy of elimination of rubella in the population by immunizing all children, and this is proving much more successful. It must be said that in 1970 the logic of adopting a selective policy was deliberately to allow the circulation of the rubella virus to provide natural immunity and help to boost the vaccine-induced antibodies. However, the policy did depend on achieving 100% immunization of the target group as well as 100% effectiveness of the vaccine. Neither of these aims was achieved.

The policy was changed in 1988 to the complete elimination of rubella. The introduction of the MMR vaccine aims to achieve this. Experience in other countries has shown that the vaccine is popular and increases the level of immunity against measles as well as reducing the morbidity for mumps.

Until the introduction of the MMR vaccine in 1988 immunization against mumps in the UK was not routinely available. Monovalent vaccine was given on a very limited scale, mainly by GPs.

However, live attenuated mumps virus vaccine has been used for many years in other countries with great success. It is usually given combined with measles and rubella. Mumps is usually a mild childhood illness with swelling and tenderness of the salivary glands. It occurs in epidemic cycles every 2 to 3 years.

Mumps is the most common cause of viral meningitis and encephalitis in children under the age of 15 years. It can also cause permanent deafness. Orchitis is a common complication after the age of puberty. Evidence now suggests that mumps is not an important cause of sterility. In England and Wales there are on average 1200 hospital admissions annually because of mumps, and about 400 of these are for

meningitis.

A single dose of mumps vaccine achieves over 95% seroconversion and antibodies are at a satisfactory level for at least 8 years after vaccination. Evidence from various countries suggests a very high level of protection. For example, in Japan in a group of children exposed to mumps, none of those who were immunized developed symptoms, whereas 70% of the unimmunized children succumbed to the infection.

The MMR vaccine is a freeze-dried preparation containing live attenuated measles, mumps and rubella viruses. The effectiveness of the various components are in no way diminished in the combined vaccine.

*Tuberculosis.* The vaccine is a non-virulent strain of bovine tubercle bacillus: the bacille of Calmette and Guérin (BCG). It is only given after tuberculin skin-testing by Mantoux or Heaf tests has proved that the person is negative or insensitive to tuberculin. A positive tuberculin test indicates previous infection by the tubercle bacillus, usually in a subclinical form. It is routine at present in Britain to tuberculin-test all adolescent schoolchildren (12–14 years) and to administer BCG vaccine to the negative reactors. The control of tuberculosis in the indigenous population is now so good that the value of continuing this vaccination programme has been questioned. It is the policy also to vaccinate certain other high-risk groups (see Chapter 9).

Controlled trials of the BCG vaccine in Britain have found it gives over 70% protection and this immunity is maintained at a high level for at least 10 years. During the trials no-one in the vaccinated group contracted miliary tuberculosis or tuberculous meningitis, though a number of cases occurred amongst the controls. However, it should be pointed out that some overseas trials have given less favourable results. Even assuming that the vaccine is safe, effective and cheap, the school vaccination programme requires to be reassessed in view of the decreasing incidence of tuberculosis. It is estimated that the school programme is four times more expensive than treating cases of tuberculosis as they occur. The British Thoracic Association research committee estimated that for lifetime residents of England and Wales BCG vaccination of 100 000 older schoolchildren in 1978 would prevent about 44 notifications of tuberculosis in the succeeding 15 years: in other words 4600 vaccinations would be needed to prevent one notification in the next 15 years<sup>6</sup>. The other problem with the school programme is that by converting contacts to tuberculin-positive, it makes it more difficult to trace contacts using tuberculin-testing.

*Influenza.* There has been a considerable improvement in the potency of influenza vaccines containing inactivated virus as techniques are

now available to rapidly include the most recent strains. In the past the vaccine has been bedevilled by the rapid change in the antigenic structure of the virus. A number of studies have been carried out comparing the sickness absence rates amongst those who volunteered for vaccinations and those who did not. Problems with this sort of study have been discussed earlier; suffice it here to say that the two groups may be different. However, it appears that the vaccine has only a minor effect on the amount of illness. In addition, experience shows that less than 30% of the working population, when offered the vaccine, will accept. In 1976 in the USA, a massive vaccination campaign was launched following concern about swine influenza. As a result of this, approximately one in 130 000 healthy people who had been vaccinated developed Guillain-Barré syndrome (polyneuritis).

In addition to this evidence, influenza is generally a mild illness so it seems prudent to follow the official advice and reserve the vaccine for special cases who have a higher mortality from the disease, such as the elderly and those suffering from chronic respiratory and cardiac disease.

*Smallpox.* The elimination of smallpox on a world-wide basis was declared by the World Health Assembly in 1980.

Because of the small but very definite risk of complications (post vaccinal encephalitis and generalized vaccinia) following vaccination, routine vaccination of children against smallpox was discontinued in Britain in 1971. Smallpox vaccination is not officially required for entry into any country.

*Cholera.* This disease is still endemic in many countries of the world where serious epidemics also occur. It appears as sporadic imported cases in Western countries or in localized epidemics where standards of hygiene are inadequate. Cholera vaccine has been shown to be largely ineffective, both in increasing the immunity of a population generally and in containing the spread of the disease during an outbreak.

*Typhoid and paratyphoid.* The majority of people who develop typhoid and paratyphoid were infected abroad in an endemic area; rare outbreaks have occurred from the importation of contaminated canned foods. For many years a largely ineffective vaccine containing killed *Salmonella typhi* and *Salmonella paratyphi* A and B (TAB vaccine) was recommended for travellers abroad and was used by the armed forces. In 1982 the Committee on the Review of Medicines (see Chapter 4) advised against the use of the TAB vaccine because of lack of evidence of its effectiveness. The monovalent typhoid vaccine (containing killed *Salmonella typhi* organisms) gives substantial

protection against typhoid fever (probably up to 80%). The important message here is that these vaccines are no substitute in the protection of travellers for the precautions necessary in overseas countries with low hygienic standards: taking care to avoid uncooked food, such as salads, and not drinking local tap water.

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## The National Health Service and social services

### INTRODUCTION

This chapter describes the structure and function of the National Health Service and local authority Social Services departments in England, with brief accounts of the main differences in Wales, Scotland and Northern Ireland. The health and social services operate within a legal framework and a short description is given of the process by which law is formulated and implemented. A brief outline of the social security system is also given.

Most nations have some form of systemized health service, and no two are exactly the same: a health-care system evolves uniquely from the economic, cultural, political and social background of its parent society.

In most Communist countries the State directly finances the health services, whilst in most Western countries health services are, to a greater or lesser extent, supported by compulsory insurance schemes based on employment and income. The British National Health Service is an exception, being financed largely from general tax revenue. Whatever form of health service operates it co-exists with private practice and this is a feature even of Communist countries.

The Labour Government which came into office at the end of World War II passed the National Health Service Act 1946 as part of a large block of social legislation that formed the foundation for the so-called Welfare State. The Act came into force on 5 July 1948 and involved major administrative changes both for the hospital and local government health services and introduced an organizational framework for general practice. Comprehensive medical care became available from general practitioners, hospitals and specialist services to all residents in the United Kingdom, free of charge at the point of delivery of service and with no qualifying conditions such as financial contribution. The principle of universal coverage was firmly established with medical care and treatment becoming available in accordance with need alone.

The essential features of the service have remained unchanged, but the administrative structure was altered in 1974 to unify the components of the services. Further changes occurred in 1982 which devolved much of the responsibility for the services to local health districts and simplified the administrative structure.

It is important to keep in mind that on 5 July 1948 no new hospitals were built, no new doctors and nurses were appointed: total resources remained the same as 4 July 1948. Locations which had well-developed health services started with a considerable advantage which has been maintained over the years. History played an important part in the type of health service which now exists.

The National Health Service is often cynically described as a national 'sickness' service, not a national 'health' service, because virtually all the resources are devoted to the care of the sick and only a small proportion to prevention of illness. There may be some justification in this criticism, but looking after those who are sick is an essential and important aspect of any caring society. The advent of the National Health Service may have contributed little to lowering mortality rates, but it has wrought major improvements in the quality of life of many people.

## **HISTORICAL PERSPECTIVE**

### **The Poor Law**

The development of services for the sick, aged and infirm in Britain is inextricably linked to the attitudes of society at various points in history towards the poor, for it was often the case that sickness and old age were states which co-existed with poverty.

Much of the responsibility for the poor, aged and sick in mediaeval Britain fell on the church and on parishes which often levied local taxes to assist them in providing relief. With the dissolution of the monasteries and religious fraternities by Henry VIII, a considerable amount of hardship was created, leaving large numbers of elderly and sick people with no means of support. Many individual items of legislation passed during the reign of Elizabeth I were rationalized in 1601 with the passage of the Elizabethan Poor Law (most commonly referred to as the 'Old Poor Law'). Under this law the 'impotent poor' (e.g. the old or sick) were to be cared for in poorhouses or almshouses, whilst able-bodied paupers were provided with work in houses of correction. Much of the responsibility for the administration of the Old Poor Law rested with individual local parishes in the form of parish overseers. And, whilst tyranny undoubtedly existed, there were many

examples also of 'caring' parishes. Dissatisfaction with the Old Poor Law mounted for several reasons.

Firstly, and at the simplest level, the law was proving an increasingly costly exercise. The system of 'outdoor relief' was becoming widespread in many parishes: it proved simpler to administer payments in cash or kind to the poor, but because of the economic problems of the time, the size of the pool of such needy individuals and their families had grown. Secondly, some critics considered that the regimes in houses of correction were too comfortable for their inmates. This climate of opinion led ultimately to the establishment of a Royal Commission of Inquiry into the Poor Law and the subsequent Poor Law Amendment Act 1834 (the 'New Poor Law'). Many commentators regard this resulting legislation as being strongly aligned to the Utilitarian philosophy of Jeremy Bentham (1748-1832), and his follower Edwin Chadwick (1800-1890), the latter being intimately involved in the framing and implementation of the legislation.

It was believed that the old system of poor relief and the condition of the houses of correction might actually encourage idleness and pauperism. The New Poor Law intended to abolish pauperism if it could and set out to do so by measures based on deterrence. The system of outdoor relief of the poor was abolished; those in need of support had to apply for it and were offered the workhouse. The workhouse regime was harsh and austere, deliberately designed to pose a very unattractive prospect for the person applying for poor relief. By this central tenet of 'less eligibility' (the person receiving poor relief could not be better off than the worst-paid independent worker) it was reasoned that only those who were truly needy would then accept poor relief in the form of the workhouse.

Under the New Poor Law responsibility was taken out of the hands of individual parishes, which were grouped together as Poor Law Unions (administered by Boards of Guardians), and placed under the control of a central body headed by three Poor Law Commissioners, the aim being to introduce a uniform process of administration. Although separate provision was laid down for the sick and aged, in practice few Unions allowed themselves the expensive luxury of separate workhouses and in many mixed workhouses the able-bodied pauper rubbed shoulders with the sick, the old and infirm, children and the mentally handicapped.

Gradually, many workhouses set aside annexes or 'wards' for the care of the sick pauper; in a few individual workhouse infirmaries were to be found and the rudiments of a domiciliary service for the sick poor were also present. Standards within such premises were, however, pitifully inadequate with overcrowding and insanitary conditions prevailing. 'Nursing' was carried out by other inmates. Moreover, the

crux of the problem was still that the law implied that poverty was a result of idleness or waywardness on the part of the individual. Florence Nightingale at the time commented that the civilian hospitals were just as bad, as, or worse, than the squalid military hospitals which she so strongly condemned in the Crimean War. Towards the end of the century conditions had become so appalling that Parliament authorized the building of separate infirmaries with trained medical and nursing staff.

### **The local authority hospitals**

In addition to the Poor Law medical service, the major local authorities (County and County Borough Councils) provided a separate publicly owned system of hospitals which had its origins in the isolation hospitals for infectious diseases and asylums for the mentally ill and handicapped. However, in many regions of the country in the early part of the present century local authority hospitals were also treating other, more general, illnesses. Following the transfer of the powers and responsibilities of the Poor Law to local government by a further Act of Parliament in 1929, the local authorities also took control of and administered the Poor Law infirmaries, thus creating some degree of unity. The local authority hospitals fell mainly under the jurisdiction of the Medical Officer of Health, who delegated his responsibility in each hospital to a Medical Superintendent.

### **Voluntary hospitals**

A small number of hospitals had been provided from earliest times by ecclesiastical bodies. However, the main alternative to the publicly owned hospital system was the voluntary hospital movement, which sprang up in the middle of the eighteenth century and was run by independent organizations obtaining their finance from charitable funds and subscriptions. There was a great variation in the size and function of the voluntary hospitals, but in general and initially they provided a standard of care which was far above that in the public sector and indeed served as a model which the latter strove to attain. Each voluntary hospital had its own committee of governors and medical care was provided by visiting physicians and surgeons who were almost always in private practice and provided their services to the voluntary hospitals free of charge. Although the system was variable, patients who could afford to pay were often asked to do so and some of the remainder had provided themselves with some security for illness by making weekly payments to one of the hospital contributory schemes. As the involvement of the medical profession in the voluntary hospitals grew with the flourishing of teaching and research, so their function began to alter. Admission policies were selective, with an

emphasis on patients with illnesses which were of a short-term or acute nature, thus ensuring a rapid turnover, or with diseases which were of particular interest. There was little place for the elderly or chronically sick and it was this emphasis on acute medicine which was partly responsible for the extension in the last century of the State-owned hospital service to fill the gap.

### **The Emergency Medical Service**

As part of the preparation for the anticipated receipt of military and civilian casualties during the Second World War, a hospital service was created in 1938 to be administered directly by the Ministry of Health. The number of beds in some hospitals was increased, temporary buildings were erected or premises extended, and some of the former poor law institutions were renovated or upgraded. Some centres were created with specialist facilities for, for example, rehabilitation, plastic surgery or neurosurgery and the Ministry laid down what the functions of the existing hospitals should be on a regional basis.

The Emergency Medical Service is of considerable importance in the development of the health service. Although its influence was short, in the context of the long period of evolution of the service it represented a watershed for the hospital service.

It resulted in the review and classification of all hospitals provided by the wide variety of agencies and brought their administration for the first time under a central authority in the shape of the Ministry of Health. This laid the foundation for the unified hospital service when the National Health Service came into being shortly after the war had ended.

### **Primary care**

Medical services for those who did not receive care in hospital was slower to evolve. Under the Poor Law, domiciliary care or treatment by the Poor Law Medical Officer existed in some parts of the country but the standard was very variable and care was generally of a very basic kind. Other forms of care were provided by a variety of other agencies, for example, in the form of free dispensaries run on charitable lines or outpatient departments of the voluntary hospitals. Some other developments during the nineteenth century provided private panel systems or clubs where, by paying a retention fee, the patient could claim the services of a doctor in time of need. Friendly societies and a few industries also operated similar schemes.

However, the National Health Insurance Act 1911 (the Lloyd George Act) was the major step forward. The scheme was directed at relieving hardship amongst working men during periods of illness. When it was introduced in 1912, it was confined to workers earning less

than £160 per year and was based on contributions from employee, employer and State. It entitled the insured person to choose his own general practitioner from a panel of doctors in his own locality (hence the term 'panel system') and to secure treatment (including prescribed drugs) or other consultations from him free of charge when he thought it necessary. The exclusion of dependants' wives and children from the scheme, together with the denial of the right of insured people to receive free hospital inpatient care, meant that considerable hardship was left untouched. Moreover, a sizeable proportion of the population still paid a fee to their general practitioner for advice or treatment.

This system continued (although the eligibility in terms of lowest income was subsequently widened) until the National Health Service was established in 1948. Up until then, general practitioner services were administered by a network of insurance committees throughout the country responsible for making available these services for all insured people in their locality, almost half the population.

### **Other local authority services**

The new industrial towns which were the product of the industrial revolution forced the issue of the need to consider health problems on a population or community-wide basis. As a growing proportion of the population came to live in towns and work in factories so, in turn, they found themselves in an environment characterized by scarce and overcrowded housing of a very poor standard, pollution, inadequate sanitation, a contaminated water supply and undernourishment. Such conditions were ripe for the infectious diseases to flourish, and they did, ravaging the population and taking a high toll in mortality, particularly in the young. The great milestones along the path to reform were the reports and legislation relating to public health, in the middle of the nineteenth century, which once again bore the mark of Edwin Chadwick, this time in the guise of public health reformer rather than implementer of the unpopular New Poor Law. The first Medical Officer of Health was appointed in Liverpool in 1847 and other local authorities soon followed suit.

These Victorian reforms led to the provision of an adequate pure water supply, effective sanitation, drainage and disposal of sewage, improved standards of housing, which all played a part in the reduction in mortality in the last quarter of the nineteenth century and the early twentieth century. Public health responsibilities including the control of the spread of infectious diseases and the environmental hazards remained a function of local authorities when the NHS was established in 1948.

Local authorities then turned their attention to personal health services for people in the community, which became a major feature of

their work during the present century. The Poor Law had provided towards the end of the last century a form of community service (e.g. for expectant mothers and children) but this was patchy and inadequate. During the first 20 years of this century, the health-visitor system was developed and maternity and child-welfare clinics were opened. Thus by 1948, the local authorities not only had responsibility for a large part of the hospital service but for a whole range of community services. When the NHS was established they continued to be responsible for the community services but lost responsibility for the hospitals.

The personal social services which were provided by the local authorities for groups like the elderly, children, the physically and mentally handicapped also had diverse origins. In some cases services arose from voluntary or charitable organizations, in most others from the structure of the Poor Law with its strong orientation towards institutional care. Although local authorities took over certain services as time went on, it was not until the implementation of the National Assistance Act 1948 that they became responsible for providing welfare services in any comprehensive way.

### **Emergence of clinicians**

Until the middle of the nineteenth century there were three types of medical practitioners, who treated patients mainly at home.

- (a) The physician (the most highly respected) who was university educated and licensed by the Royal College of Physicians.
- (b) The surgeon, who learnt his craft by apprenticeship and was licensed by the London Company of Surgeons.
- (c) The apothecary (the lowest status) was trained as a tradesman by apprenticeship and licensed by the Society of Apothecaries which was originally a city trading company. Later the training included six months dispensary or hospital experience.

The Medical Acts, 1858 and 1886, removed these divisions and laid down a framework for common training and registration of all doctors practising medicine. Initially, therefore, there was no distinction between the training or experience of general practitioners and consultants. The latter were identified because they held hospital appointments. Later, specialist training was established, but even in 1948 the majority of specialists were in general medicine and surgery. In the following years there was a rapid expansion of established specialties and the creation of new ones.

### **The welfare state and with it the National Health Service**

In the summer of 1941 the government appointed Sir William (later

Lord) Beveridge (1879–1963) to chair a committee of senior civil servants to undertake a survey of existing national schemes of social insurance and allied services and to make recommendations. The Beveridge report<sup>1</sup>, published a relatively short time later in December 1942, contained a series of sweeping proposals and recommendations which laid the foundation for the modern welfare state.

Beveridge based his proposals for a compulsory social security scheme on three assumptions: that there would be a policy for the maintenance of employment, a system of children's allowances, and a comprehensive health service.

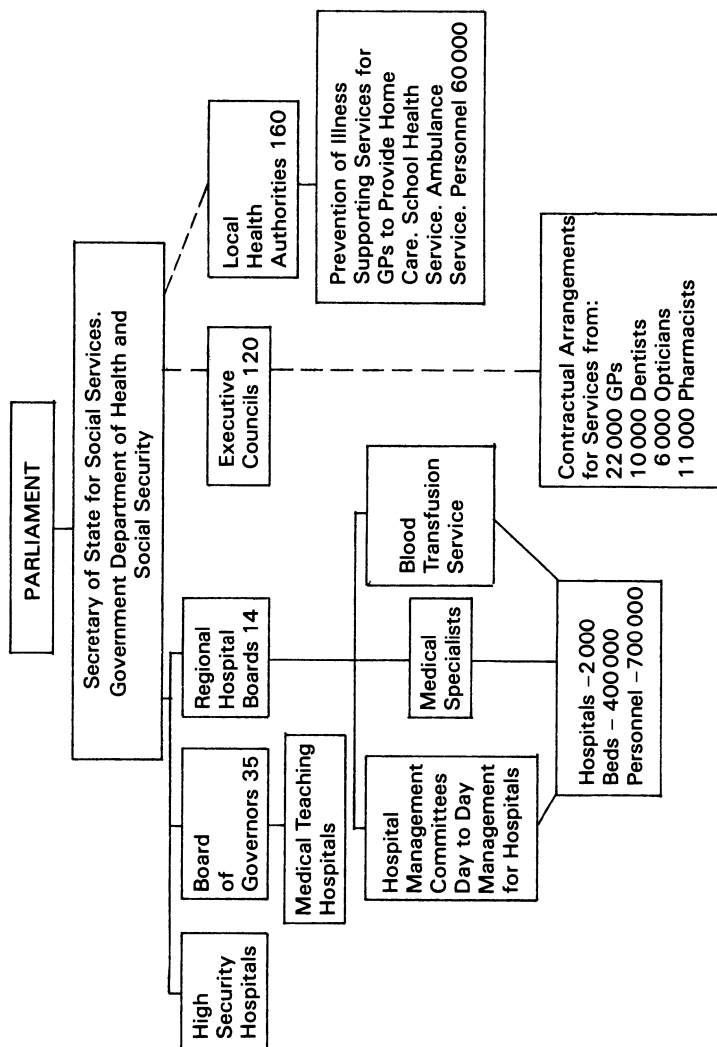
The basis of the report was enacted by the post-war Labour Government and the subsequent legislation was contained in five main acts:

- (1) The Family Allowances Act 1945 provided for cash allowances to the second and subsequent child.
- (2) The National Insurance Act 1946 established a comprehensive contributory national insurance scheme.
- (3) The National Insurance (Industrial Injuries) Act 1946 made provision for insurance against accidents, injuries and prescribed diseases due to a person's employment.
- (4) The National Assistance Act 1948 finally dismantled the Poor Law, placed on local authorities the responsibility for the elderly, handicapped and homeless, and set up a scheme for financial assistance on a national basis to those in need.
- (5) The National Health Service Act 1946 made a comprehensive health service available to all citizens.

When the National Health Service started on 5 July 1948, the Minister of Health became responsible for providing a comprehensive health service for the population of England and Wales. All hospital property, whether it had been in the voluntary or municipal sector, came under the control of the Minister and all but a small number of hospitals which remained privately owned were included. Thus the Minister inherited a wide array of buildings and accommodation with varying origins, traditions and functions with differing levels of upkeep and spread unevenly throughout the country. However, the administrative merging of these made it possible to plan a hospital service for a locality, to rationalize the distribution of and to make arrangements for the training of medical, nursing and technical staff.

The structure of the service which was created is shown in Figure 4.1. England was originally divided into 13 regions (four in London and the home counties and nine in the rest of the country) with regional hospital boards whose chairman and members were appointed by the Minister. A further region – Wessex – was created later to make a total





**Figure 4.1** NHS in England (pre-1974). Note: All figures are approximate and relate to England and Wales only in the early 1970s. Personnel statistics are in full-time equivalent. Source: Donaldson, R. J. (1977). *The New Health Service in Britain: Its Reorganization Outlined*. (London: The Royal Society of Health).

of 14. These regional boards appointed hospital management committees to be responsible for the day-to-day running of individual hospitals or groups of hospitals. Teaching hospitals had separate arrangements, being administered by Boards of Governors appointed by the Minister and responsible directly to him and not the regional hospital boards.

The National Health Service also provided general medical, general dental, ophthalmic and pharmaceutical services on a contractual basis with local Executive Councils. Thus, with the advent of the NHS, primary medical care was also provided free and as a right for all who wished to request it.

Aside from therapeutic services which were based in hospitals or general practice, the NHS laid down a range of other services concerned with the health of the population which were delivered mainly by major local health authorities (Counties and County Boroughs). This was the only part of the new service which had specific responsibility for the prevention of disease, although little detail was laid down, so that the scope for innovation by individual local authorities in this sphere was considerable. The authorities discharged their functions through Health Committees whose chief officer was the Medical Officer of Health. In addition to the general responsibility for developing a preventive function, local health authorities were charged with providing a range of supportive services. These included: a wide variety of 'community' services (such as health visitors, home nurses, domiciliary midwives and home helps) to provide care, support and advice to people in their own homes, a responsibility for the control of infectious diseases including immunization and vaccination, the care of expectant mothers, infants and young children, the provision of an ambulance service, and the provision of health centres. The latter, which was seen as a major role for the local health authorities when the NHS was formed, was very slow to get off the ground.

### **The unified health service**

Between 1948 and 1973 the health service was organized in a so-called 'tripartite' fashion whose three components were:

- (a) the hospital service (administered by Regional Hospital Boards and a network of hospital management committees at a local level) and teaching hospitals (administered by Boards of Governors),
- (b) the family practitioner services (contracts held by executive councils),
- (c) the local authority health services (which operated within the sphere of local government administration to provide public

health services in the form of infectious diseases and environmental hazard control, preventive services and community based services).

The 1974 reorganization of the NHS was concerned with the administration of the service, but its main aim was to provide a better, more sensitive and co-ordinated service to the public. Both patients and providers stood to gain if the administration embodied both a clear duty to improve the service and the facilities for doing so.

The changes which took place on 1 April 1974 were the first since the National Health Service was established 25 years previously. Before 1974 it had never been the responsibility, nor had it been within the jurisdiction of any single named authority, to provide a comprehensive health service for the population of a given area. It had also not been easy to balance needs and priorities rationally and to plan and provide an integrated service within the resources available.

A further restructuring took place in 1982 and the present unified service in England can be described in three tiers. It is headed by the Secretary of State for Social Services, the second tier is made up of 14 Regional Health Authorities (RHAs) and the third tier comprises 192 District Health Authorities (DHAs). Between 1974 and 1982, the third tier consisted of 90 Area Health Authorities.

### *Criticism of the 1974 reorganization*

Reorganization of the administrative structure in 1974 attracted criticism, not least from those working within the health service. Not all the adverse comments were justified. The changes coincided with financial stringency resulting from national economic problems, which in turn led to industrial unrest amongst workers in the health services, including groups for whom strike action would have been unthinkable had it been suggested earlier. Discontent amongst health service workers was, however, no new phenomenon. Mr Enoch Powell records that when he was Minister of Health in the early 1960s he met with a string of complaints from health service workers and this differed from the experience of Ministers in charge of other services. As a parallel development, various professional groups such as nurses were seeking and obtaining greater professional independence. All of this would have happened in any case, but reorganization tended to be blamed for the conflicts that arose.

Nevertheless, the structure had major faults. The most strident criticisms were of too many levels of responsibility, too many committees and too many administrators divorced from patient contact; the latter a particularly potent rallying cry in a clinically-dominated service. Furthermore, the desire to ensure the full

cognizance of all relevant interests produced an elaborate consultative machinery which led to cumbersome and slow decision-making. The DHSS issued about 200 circulars and memoranda annually giving guidance, sometimes in considerable detail, about various aspects of the service and this in some quarters was strongly criticized and resented. A national pattern of senior appointments was adopted by the great majority of authorities and there was little sign of innovation in what proved to be a very unpopular bureaucratic and mechanistic model.

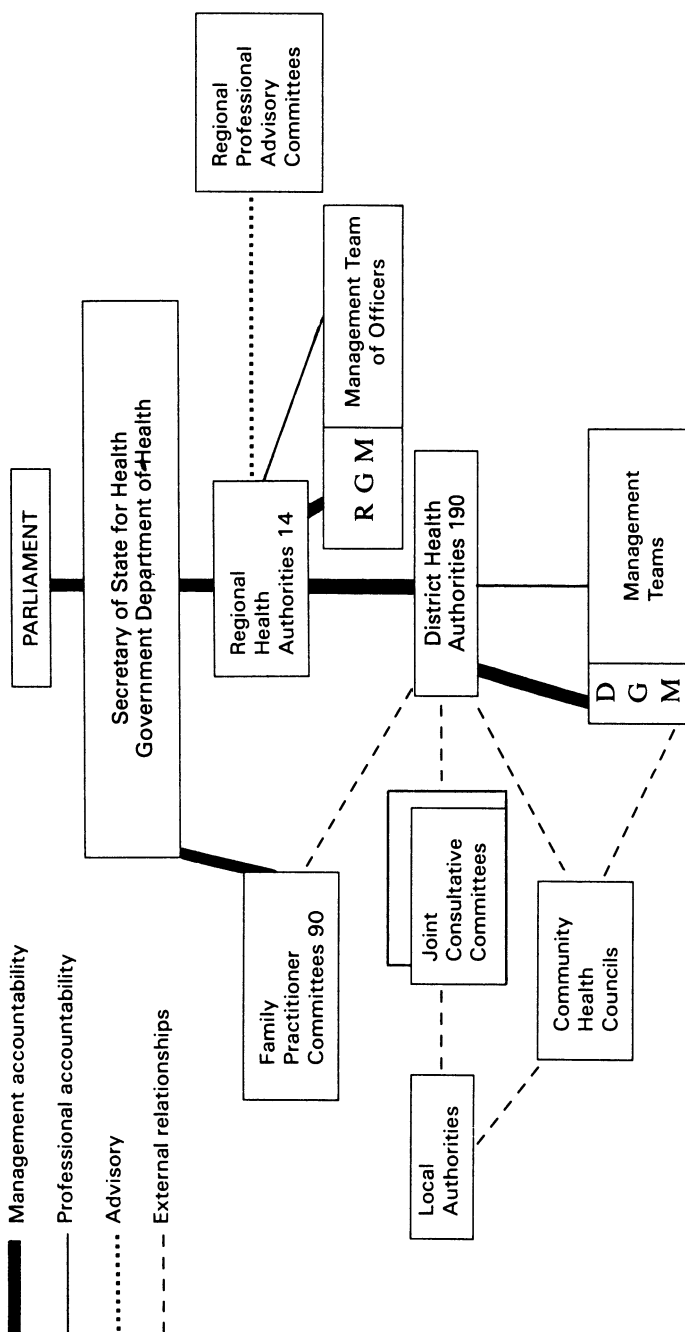
The 1982 restructuring attempted to solve some of these problems by removing one administrative tier (AHAs) and devolving from the centre the responsibility for providing the service within available resources. The new district authorities were also left to decide on the type of organizational structure most suited to local needs. Before the impact of this 1982 reorganization could be fully realized, further major changes to the organization of the service were brought about by action taken after an NHS Management Inquiry in 1983. The most noticeable consequence of the 'Griffiths Report' was the introduction, for the first time, of general managers at various levels within the health service. This change in emphasis in the management of the service is described later in this chapter.

## **PRESENT STRUCTURE OF THE NHS**

The reader may find it helpful to refer to Figure 4.2 when studying this section.

The Secretary of State has overall responsibility to Parliament for the National Health Service in England. As a result of the most recent changes to the organization of the health service, two committees operate within the Department of Health (DH):

- (i) *Health Service Supervisory Board* – Chaired by the Secretary of State, its membership includes the Minister of Health, the Permanent Secretary, the Chief Medical Officer, the Chief Nursing Officer, the Chairman of the NHS Management Board (see below) and Mr Roy Griffiths (the leader of the NHS Management Inquiry Team). The Supervisory Board has four main functions:
  - (a) Determination of the purpose, objectives and direction of the Health Service;
  - (b) Approval of overall budget and resource allocations;
  - (c) Making major strategic decisions;



**Figure 4.2** Structure of the NHS from 1985 onwards in England.

- (d) Receiving reports on performance and other aspects of evaluation from within the service.
- (ii) *NHS Management Board* – a small multi-professional body under the direction of the Supervisory Board, and also chaired by the Secretary of State. The Chief Executive acts as the General Manager of the health service at a national level, and is vested with executive authority derived from the Secretary of State. The Management Board has four main functions:
  - (a) To implement policies approved by the Supervisory Board;
  - (b) To give leadership to the management of the NHS;
  - (c) To control performance;
  - (d) To achieve consistency and drive over the long-term.

Members of the Board include Directors of: Finance, Planning and Technical Information, Health Authority Liaison, Operations, Financial Management and Personnel. The Chief Medical Officer and Chief Nursing Officer also serve on the board.

### *Regional Health Authorities (RHAs)*

The location and size of RHAs are determined so that each region has at least one university medical school within its boundaries. They are based geographically on the regions previously used for the hospital services when the NHS came into being in 1948 (Figure 4.3). The RHAs replaced these Regional Hospital Boards in 1974, taking over their role in the hospital service and extending it to include community health services in their strategic plans. The populations of the regions range from two to five million.

The chairman and members of each RHA are appointed by the Secretary of State. There are approximately 17 members in each, with representatives of the main health professions, universities, trade unions and voluntary organizations. One third of the membership is from local authorities. The Chairman is paid a small salary, while members are not paid but all are entitled to out of pocket expenses. Each RHA is accountable to the Secretary of State for its own activities and for the DHAs under its control. The regional task is in part strategic planning, in part coordination and supervision and in part executive. The authority develops plans and priorities based on the needs identified by its constituent DHAs and correctly balances the individual claims on resources.

The RHA is responsible for identifying and providing services which need a regional rather than a district approach and develops, with professional advice, an overall regional plan for specialist services. The deployment within the region of senior hospital, dental and scientific staff is determined by this plan. There is a special responsibility for ensuring that satisfactory service facilities are provided to support medical and dental teaching, both under-graduate and post-graduate,



**Figure 4.3** Health regions, England and Wales from April 1982

and research. It must, therefore, have a close relationship with the university. It provides some operational services from a regional base, such as the Blood Transfusion Service. RHAs are responsible for the design and construction of major new buildings and support DHAs with more highly specialized management services.

The RHA reviews the plans of each of the DHAs to satisfy itself that they contain programmes to achieve the necessary improvements in services, that their goals are attainable within the available resources, that their objectives are consistent with national and regional policies and that they have been co-ordinated with the planning and operational activities of local government authorities. Resources are allocated to each district and the performance monitored against the agreed objectives.

The RHA employs hospital medical and dental consultants and senior registrars of non-teaching DHAs. It also appoints all DHA members, except those appointed by local government authorities.

*Management at Regional Level* – The Regional General Manager (RGM) is accountable to the RHA for the day-to-day running of its services as well as providing advice on future policy, priorities and the need for change. The RGM is the Chief Officer of the health authority; he is assisted by other senior officers – typically a Medical Officer, Nursing Officer, Treasurer, Works Officer and Administrator. The arrangements by which their activities are co-ordinated vary from Region to Region but usually they have been formed into an executive team with the RGM as the leader or chairman. Additionally or alternatively, in some regions, senior officers may each take responsibility for a specific function – for example, service planning, manpower planning or quality control.

### *District Health Authorities (DHAs)*

From 1 April 1982 district health authorities replaced area health authorities and health districts in England and are now the third statutory level of the NHS. After a few years of operating the 1974 reorganization, there was general agreement that too many administrative levels existed. It also seemed that single district areas (area authorities without any districts) functioned better than multi-district area authorities. Hence the new districts were modelled on pre-existing single-district areas. Each DHA is responsible for the planning, development and management of health services in its district within national and regional strategic guidelines. In general the new DHAs form the boundaries of the pre-existing health districts or single-district areas, although in some parts of the country, boundaries were redrawn. The DHAs are responsible for integrated planning, provision and development of all health services.

In some places the boundaries of one or more DHAs are coterminous with the boundaries of the local authority providing education and social services. Each DHA normally has 16 members: a Chairman, appointed by the Secretary of State, four members appointed by local authorities, and the rest appointed by the RHA after appropriate consultations but including a hospital consultant, a general practitioner, a nurse, a trade unionist and university representative. The DHA has considerable discretion in determining the management arrangements it adopts but the structure is subject to the approval of the RHA and DH. Each DHA is required to appoint a District General Manager (DGM) and General Managers for Units which they establish. Otherwise the DHA is free to determine, with advice from its DGM, its own management structure and establish



posts that provide the most effective and economic delivery of services within set cost limits.

*Management at District Level* – Although there is a need to comply with broad guidelines issued by the DH, and also to seek approval for local arrangements from the DH and the corresponding RHA, each DHA has considerable discretion in determining its own management structure. This accounts for the wide diversity of arrangements that exist through the country, although a key common feature is the appointment of a District General Manager (DGM). This post is of a similar nature to its Regional counterpart, but the precise duties and responsibilities reflect the different problems posed by the need to plan and provide services for a smaller but more ‘local’ population. DGMs co-ordinate the activities of other Chief Officers of the authority, and use their expertise in developing policy, by forming them into groups. Their precise composition and titles vary: in some health districts, they may be known as management boards, policy groups or executive teams. The membership might include the District Treasurer, the District Administrator, the District Medical Officer, the District Nursing Officer as well as representatives of the Consultant Medical Staff and General Practitioners. If the DGM has come from within the health service (e.g. a District Administrator), that discipline often will not be represented with Chief Officer status. In other district authorities, like some regions, Chief Officers carry out functional roles (e.g. service planning, evaluation, community services). The DGM leads the team and is accountable to the District Health Authority for the management of the service and also provides it with advice on policy, priorities and future developments. The DGM is accountable for the performance of the team as a whole in developing policies and possible courses of action and ensuring the provision of proper advice.

Professional Chief Officers are directly accountable; and have the right of access to the authority on the provision and quality of professional advice.

Within each district the service is further organized into *units* typically covering each major hospital or hospital group as well as community services. Each unit is headed by a Unit General Manager (UGM) who is managerially accountable to the DGM for the running, performance and deployment of resources within the unit and also for the planning and implementation of its policies. In these tasks, the UGM will be assisted by a team of senior staff, which vary in composition within different Authorities. The principal objective of the unit management structure is to locate the management functions as near to the patient in hospital or the person in the community as is practicable. It is at this level in the service where most patients are seen, most money is spent and most staff are employed.

**Family Practitioner Committees (FPCs)**

These are statutory Authorities directly accountable to the Secretary of State across the whole field of their responsibility for local arrangements involving the Family Practitioner Services. There are 90 FPCs in England and 8 in Wales. In Scotland and N. Ireland there are no separate FPCs and the administrative responsibilities are carried out by Health Boards.

The functions of the FPCs include maintaining lists of contractors and taking responsibility for their remuneration; monitoring arrangements for medical deputising services; approval of doctors' surgery premises; an arrangement for improving premises; investigation of complaints involving the services and the custody and transferral of certain records. FPCs also have duties as employers of their staff. Additionally FPCs are responsible for ensuring that the local population receives adequate personal care and attendance from Family Practitioner Services.

The Family Practitioner Services are provided by family doctors, dentists, opticians and pharmacists. These practitioners are not NHS employees. They make their services available under contracts administered by FPCs. The Committee normally consists of a Chairman and 30 members appointed by the Secretary of State but FPCs relating to more than 4 DHAs are larger. Of the 30 members, 15 'professional' appointments are made from nominations by the FPC's local representative committees. Of the 15 'lay' members 4 appointments each are made from nominations received from DHAs and local authorities. The remaining 7 places are filled from nominations by a wide variety of organizations. The membership must include a nurse with community experience.

The FPC is advised by 4 local representative committees – the local Medical Committee (which advises on matters in relation to general practice and normally has 8 members on the FPC); the local Dental Committee (which advises on matters concerning General Dental Practitioners and has 3 members on the FPC); the local Pharmaceutical Committee (which advises on pharmaceutical matters and has 2 members on the FPC) and the local Optical Committee (which advises on ophthalmic services and has 2 members on the FPC).

Expenditure on Family Practitioner Services is reimbursed by the DHSS with an 'open-ended' commitment and is not subject to the budgetary control applied to other parts of the National Health Service. There are, however, constraints concerning fees (which are negotiated nationally) and the use of drugs. The General Practitioner is free to prescribe whatever treatment he judges most suitable, but prescribing costs are monitored and he may be called upon to justify those that are higher than average.

From 1948 the pharmaceutical service has been a major component of the Family Practitioner Service expenditure; initially it represented about a third of the total expenditure, and by 1977 it had risen to about half of the total.

FPCs have a duty to collaborate with District Health Authorities and other bodies in planning of health services and are represented on the Joint Consultative Committee between Health and Social Services.

### *Professional advisory machinery*

Advisory machinery to allow the various professional interests to put their viewpoints in the process of decision-making is established at each level of the NHS. The main advisory body at national level is the Central Health Services Council for England and Wales. Members are appointed by the Secretary of State from a wide range of professions. The Council has a number of standing committees dealing with different professional interests (medical, dental, pharmaceutical, ophthalmic and nursing) and also has committees dealing with special topics such as immunization. At regional level there is often a network of advisory committees from the same five professions.

The regional medical advisory machinery is based on medical specialty groups. Regions vary in the number of specialist advisory committees they appoint, but may have committees for general medicine, general surgery, orthopaedics, radiology, dermatology and so on. Representatives of consultants in the specialties concerned are drawn from different parts of the region. These committees are consulted about planning and staffing matters. Medical advisory arrangements at District level are provided more informally on an *ad hoc* basis, but formal divisions, e.g. medicine, surgery, obstetrics and gynaecology, exist in many places.

When a district health authority requires specialist medical advice it seeks guidance from its senior medical staff as to where best to obtain it. If general advice is required on the broad medical view of priorities or the allocation of resources, then the view of doctors in the district would be channelled to the authority through the medical members of the management team.

A move towards better management of hospital medical staff started with a report in 1967 of a working party on organization of medical work in hospitals – two further reports followed in 1972 and 1974. The name ‘cogwheel’ was coined, at first derisively, but later adopted generally from the design on the cover of the booklet.

Many hospitals operate the ‘cogwheel system’ which has established specialty divisions (cogwheels) which allow doctors working in a specialty to review their service and co-ordinate their work. Although primarily for doctors, in some hospitals other disciplines (e.g. nurses)

attend the meetings as appropriate. These cogwheel divisions report to a Medical Executive Committee consisting of representatives of divisions which co-ordinates all the medical work in the hospital.

### **Management in the NHS**

One of the objectives of the 1974 and 1982 reorganization was to improve management and one of the major principles was that "delegation downwards should be matched by accountability upwards". This phrase, though sometimes re-stated, still remains as a maxim. The design and implementation of a suitable management structure for the NHS is not a straightforward task. Many existing models in industry or commerce are not appropriate to its particular circumstances. A factory has a relatively small number of senior managers who are independent decision-makers at the top of the organization and the workers on the shop floor act under orders. Also, in the NHS there is no end 'product' such as a motor car. In contrast, in the NHS, people working at the clinical interface such as general practitioners and consultants can independently commit resources by prescribing treatment by virtue of their clinical freedom without reference to any other authority. Hence, a simple hierarchical structure that is common in many industries and in which instructions are issued from senior to subordinate staff (with disciplinary measures taken for non-compliance) would be unsuitable for, and unacceptable in, the NHS. Thus a sophisticated and somewhat novel system of organization and management was devised. One of the key features of this management system was the introduction of consensus management – management by agreement. That is, no decision can be taken that overrides the opposition of a member of the Management Group, in effect establishing the power of veto. An issue that is unresolved is passed for resolution to the next higher authority. In practice, however, this seldom happened and difficult decisions were deferred or a weak or 'watered down' version was adopted. The main reason why the consensus approach was adopted was because of implacable opposition in 1974 to the appointment of a Chief Executive.

This aspect of management was singled out in the *NHS Management Inquiry Report* in 1983. It was rather colourfully expressed: "if Florence Nightingale were carrying her lamp through the corridors of the NHS today she would almost certainly be searching for the people in charge." The Inquiry Team, led by Mr Roy Griffiths, the Managing Director of Sainsburys, comprised four men with proven management records. It emphasized the lack of a clearly defined General Management function within the health service.

The team recognized there were differences but emphasized the clear similarities between NHS management and business management.

Both types of organizations are concerned with levels of service, quality of product, meeting budgets, cost improvement, productivity, motivating and rewarding staff, research and development and the longterm viability of the undertaking. The team pointed out that in the private sector the results in all these areas would normally be carefully monitored against pre-determined standards and objectives. The NHS does not have a profit motive but it is of course greatly concerned with the control of expenditure. The Inquiry Team expressed surprise at the absence in the NHS of any real continual evaluation of performance against criteria such as those just set out. Rarely are precise management objectives formulated; there is little measurement of health output; clinical evaluation of particular practices is by no means common and an economic evaluation of those practices is extremely rare.

Many of these management deficiencies in the NHS had already been recognized. The fundamental message from the Griffiths Report was the need for more dynamic style of management in Health Authorities: in short bringing in General Management.

*General Management* enables an organization to plan, act on, control and measure its decisions and actions effectively and efficiently; and in a way which brings results. The General Manager is the person responsible and accountable for ensuring that these decisions are made and actions taken. Where consensus had not worked well, the aim of General Management is to help people to make decisions where and when they are needed. Typically consensus management in the past has failed when difficult and painful decisions have to be made. Whilst the formal consensus approach to the management of the NHS may have been superseded by the General Management concept, in an organization as highly professionalized as the NHS most general managers will seek to obtain broad agreement on major issues.

Finally there is the position of the consultants whose influence and power as perceived by other groups of workers gives rise to concern and even hostility. This position arises largely from the consultants' (doctors' and dentists') exercise of clinical autonomy. To be fully responsible for the treatment they prescribe for their patients, consultants must have clinical freedom and in that sense they take personal responsibility for the diagnosis and treatment of their patients. In this respect they are not responsible to another doctor, manager or Health Authority for their clinical decisions. Hence, they are their own managers. They are responsible in law and in ethics to their patients.

However, it is also important to keep in mind that *freedom* does not exist anywhere without limits. Certainly there are limits on the freedom of a clinician who must keep within the law, practise within acceptable clinical standards, conform to his contract of service, abide by socially

accepted standards of behaviour and be bound by the resources available. Hence increasingly consultants will be expected to accept the management responsibility which goes with clinical freedom and be accountable for their own budgets.

Time alone will tell if those working in NHS management at different levels can accept the challenge to change direction yet again. In an atmosphere of financial stringency the new style of management could give rise to greater conflict which in the end would not be in the best interest of the service.

### **Planning**

Planning is a continuous process rather than, as it is sometimes seen, an occasional exercise. The normal process of management should include full-time planning staff working closely with managers and health-care professionals at all levels within the service: at district, at region and centrally at the DHSS, their purpose being to formulate plans and programmes within the framework of national policies and priorities and within available resources.

For the first time in the British Health Service, the 1974 reorganization made it possible to plan health care in a coherent and comprehensive way. During the 1960s there was a growing appreciation amongst providers of health services in many parts of the world of the need for a rational approach to the development of their services. This awareness must have been triggered by a number of factors such as: the growing and seemingly limitless consumer demand for medical care juxtaposed with the knowledge that the proportion of a nation's resources which could be expended on health must necessarily be limited by other competing demands and the prevailing economic climate; the need to balance competing demands for such limited resources; and known geographical inequalities in the distribution of the resources.

Planning in the NHS up to 1974 by Regional Hospital Boards concentrated on capital planning, i.e. the siting and building of hospitals and the provision of manpower. Services flowed from the operational requirements of these facilities. Particular client groups were not catered for as such.

Although opportune on grounds of logic, it was perhaps unfortunate that planning in the NHS was introduced at a time of particular financial stringency. Problems and conflicts arose with plans which involved contraction as well as the expansion of services. Two fundamental principles underlie any successful planning system. First, the existence of an adequate and accurate system of intelligence: information is the life-blood of the planning process and in the past systems of health service information have been of a generally poor

quality. Many of the difficulties arise from the extent to which such data have lain fallow within the service, but greater use would inevitably lead to weaknesses being identified. A major effort is under way to improve the quality of routinely collected information in the hospital and community services which should help with planning. Additionally data are being reorganized in a way that is of greater assistance to Managers. An example of this is the development of indicators of performance in various parts of the service. Second, there is a need for a structure which first of all perceives the need for and the importance of planning and also sees to it that plans are given a commitment and implemented. The introduction of the General Management function and the annual review procedures during 1983–1984 should be major steps forward in this slowly evolving process.

Traditionally, planning of services in the NHS has been based on the normative approach – the setting of norms for provision of services. Thus both health and local authorities used norms to determine, for example, what should be the ‘desirable’ provision of geriatric beds, residential home places for the elderly or home helps for the size of their population. Although not defined, the precise method by which such norms are derived is often far from evident and seldom challenged. Norms may alternatively be national or regional (i.e. average) levels of provision. Thus, in the normative approach to planning, norms produced from without are used to assess shortfalls locally. This inflexible route for planners has led to adoption of guidelines which may result in a service which does not necessarily reflect either the correct level of provision or the most appropriate response to need.

Increasingly service planning is based on ‘activities’ and norms are used as yardsticks. This approach seeks to assess the need for services amongst populations and to review the ways in which this need is currently being met and the extent to which the service is failing to meet the need. From this basic information, decisions are made on the most efficient and effective ways of responding to present and future needs. There is still a long way to go before information systems are fully developed which can assess need in the population. Nor is the definition of need a straightforward task and much work is still in the domain of researchers. Nevertheless the central objective of planning is to identify and meet the needs of a population in the most efficient and effective way. In an attempt to meet these aims an organizational system for planning in the NHS has been laid down.

The DH promulgates and monitors national priorities and policies in consultation with regional health authorities. It issues, annually, national planning guidelines giving resource and manpower assumptions to regional health authorities. Regional health authorities

promote implementation of these priorities and policies. They allocate the resources to the DHAs, manage the major capital programme, co-ordinate and reconcile DHA's plans and plan specialist and other services which are required on a regional basis.

The DHA is the basic planning unit which provides services in accordance with its plan. It is here that planning starts and as many as possible of the decisions are left to local discretion.

The NHS planning system consists of three important elements:

*Strategic plans.* These set out objectives for about 10 years ahead, but are reviewed regularly in the light of changing circumstances and are re-written every 5 years. Each region prepares, in collaboration with its districts, an outline strategy with guidelines which reflect agreed regional policies and DH priorities and policies.

Within this outline, each district then prepares a district strategic plan which is submitted to region. The region incorporates the proposals in a regional plan, having first reconciled the DHA's proposal for capital revenue and services and adds to the plan proposals for regionally managed services. Each RHA submits to the DH a regional strategic plan which is an overview of district strategies with plans of regionally managed and supra-district services.

*Annual Programmes.* Each year DHAs prepare an Annual Programme in accordance with agreed regional guidance and resource assumptions, but within this, as many decisions as possible are left to the DHA. The plan is in two parts and is drawn up at the end of each calendar year:

an Operational Programme with firm proposals for implementation in the following financial year, and

a forward programme with provisional proposals for the financial year after that.

The forward programme is for consultation and, after modification to take account of comments from interested bodies, will become the operational programme for the following year. These plans must be consistent with the corresponding years of the agreed strategic plan taking into account any revisions.

Plans formulated at district level take into account services by local government authorities.



*Annual Planning Reviews.* A major weakness of NHS planning was that there was no central regular review of progress towards implementing the plans. This fault was corrected in 1982. Every year a Ministerially led review takes place with the Chairman and Chief Officers of each RHA. The review examines the progress made by the Region in implementing government policies. It provides a forum for discussing the RHA's effectiveness, including the performance of their DHAs, with a view to agreeing any necessary action. Included in the discussion is the use of available resources so that the best possible value for money can be obtained. Annual reviews take place in a similar way between the RHA and each of its districts. Thus the review process is an important mechanism for ensuring accountability upwards for performance and progress in achieving national strategic aims.

### *Planning teams*

In order to assist the planning and operation of health care services, DHAs establish a number of multi-disciplinary planning teams to concentrate on planning services for particular groups within the population. These planning teams are either permanent or *ad hoc* (established to examine specific issues).

The number and types of planning teams varies from district to district depending on the views and requirements of the DHAs. Certain groups require continuous planning and monitoring, e.g. the elderly, children, the mentally ill and mentally handicapped. Services which may require *ad hoc* teams could be primary care, day surgery or out-patients' departments.

Joint planning teams are established with the local government authorities to advise on how to achieve the right balance of services between health, social or educational services for groups such as the elderly, the disabled, the mentally handicapped, the mentally ill, children and families and for special problems like alcoholism and drug addiction. Effective joint planning is vital to the overall strategy of developing community-based services to the fullest extent, so that people are kept out of hospitals and other institutions and supported within the community.

The composition of these planning teams will vary according to particular situations, but most will probably contain representatives of general practitioners, consultants, hospital and community nurses, health visitors, relevant paramedical staff and local authority services. Some teams have representatives or observers from Community

Health Councils (described later). They are supported by administrative staff and by the District Medical Officer, and he or she, or a community physician colleague is a member of each team.

### **Complaints**

Various surveys suggest that the NHS is held in high regard by the majority of the population and this seems to be borne out by the tiny proportion of formal complaints about the service arising from the vast number of contacts by members of the public. However, most of the dissatisfaction is not expressed as formal complaints and some of this feeling is channelled through a number of bodies which are striving to establish better communications between professionals and the public and to obtain greater public involvement in decisions at all levels. There is little doubt that poor communication is a main and recurring theme in complaints. This situation can only be remedied by greater emphasis on communication by all health professionals (which in some cases will require changes of attitude as well as increased awareness of the problem) and inclusion of the teaching of communication skills to those in training.

A further small step would be to ensure that booklets prepared by hospitals to help their patients should include opportunities for comments, suggestions and complaints. The DHSS issued a leaflet for patients on this subject in 1982.

Patients who wish to make complaints as a result of the treatment they have received or dissatisfaction with any other aspect of their contact with the services have a number of options open to them:

#### *(a) Health authority complaints procedure*

Virtually all written complaints to health authorities concern the hospital service, but the same procedure also applies to community services outside hospital (but not the Family Practitioner Service, which has a separate machinery).

There are about 12000 written complaints made to the hospital service annually. The investigation of complaints of a non-clinical nature is co-ordinated by the District Administrator and all members of staff involved are fully informed of any allegation and given an opportunity to reply; they are advised of their right to seek advice of their professional associations before commenting. A reply to the complaint is sent by the District Administrator following agreement with the senior staff concerned. If this agreement is not forthcoming, then the matter is referred to the DMT and if necessary to the district authority. In matters of serious concern the Chairman of the authority may reply.

Complaints relating to the exercise of clinical judgement by hospital

medical and dental staff are dealt with in three stages. It is the responsibility of the consultant in charge of the patient to investigate the clinical aspects of a complaint, usually after seeing the complainant and discussing the matters which have given rise to his or her anxieties. The formal reply is normally sent by the district administrator on behalf of the authority and the clinical matters in the reply are agreed with the consultant concerned. Sometimes the consultant may send a written reply direct to the complainant dealing with the clinical aspects.

The second stage is reached if the complainant is still dissatisfied. The RMO is informed and after further discussion with the consultant concerned, it may be considered valuable to have a further talk with the complainant. If this fails or it is thought there is no useful purpose in further meetings, then the third stage of the procedure is put into effect. The RMO then, after discussion with the consultant, makes available two independent consultants jointly to discuss the problem. They will be in active practice in the appropriate specialty and at least one would be from outside the region concerned. They discuss the case with the consultant against whom the complaint was lodged, and any other medical staff involved, and have access to the clinical records. The independent consultants discuss the clinical aspects of the problem with the complainant, who may be accompanied by relatives or friends. They make their report in confidence to the RMO who advises the district administrator, who in turn writes formally to the complainant on behalf of the authority with a copy to the consultant. The matter is treated confidentially unless publicity has been given by another party, when a reply may be appropriate.

The third-stage procedure involving independent professional review is intended for complaints of a substantial nature involving clinical judgement, but not those which would appear to be the subject of action through the courts or by the more formal procedure of the health authority.

Complaints of a more serious nature which are considered to be unsuitable for action by the health authority's officers are dealt with by more formal means which may involve setting up a committee of inquiry.

#### **(b) *Family practitioner complaints procedure***

Complaints made by the public to the FPC concerning the family practitioner service (medical, dental, pharmaceutical and ophthalmic) are limited to breach of contract with the FPC. An example of an alleged breach of contract would be the failure of a GP to visit a seriously ill patient when a house call is requested. The person must make his complaint in writing, usually within 8 weeks of the event, and it is initially dealt with by the FPC administrator informally: if this fails

it is referred to the appropriate service committee of the FPC. These committees have professional and lay members to whom the complainant and the practitioner present their cases. There is an appeals procedure which may involve the Secretary of State and a National Tribunal. About 800 cases are investigated by service committees each year. The majority concern the medical and dental professions and in well over half no breach of contract is found. The usual penalty is withholding payment, but there is provision to remove a guilty person from the list.

**(c) *Health Service Commissioner (Ombudsman)***

An independent Health Service Commissioner (Ombudsman) appointed by Parliament, was introduced when the Service was reorganized in 1974. This official has powers to investigate complaints from members of the public who consider that they have suffered injustice as a result of a failure in a service provided by a health authority, or failure to offer a service it has a duty to provide, or other examples of maladministration.

There are, however, a number of circumstances in which the Commissioner is precluded from carrying out an investigation. Examples of these are: purely clinical matters, professional services provided by doctors and others, staff appointments, and if the aggrieved person has taken proceedings to a court of law.

A member of the public must always complain first to the responsible health authority before referring the matter to the Commissioner.

About 500–600 complaints are made each year, but more than half are outside his jurisdiction mostly because the complainant has not given the health authority the opportunity to investigate the complaint. Many complaints relate to waiting time for hospital treatment, lack of communication from health professionals to patients and relatives, and problems in circumstances where patients were used for teaching or research. The Ombudsman issues an annual report in which he comments on the cases which have been reported to him.

**(d) *Courts***

A patient has recourse to the courts of law where he may allege clinical negligence. Settlements are often made out of court and this is the only route of complaint through which he can obtain financial retribution. This is not a common route for complainants in Britain, but is a major feature of medical practice in the USA where patients are much more 'litigation-minded' and doctors are inclined to plan their clinical management in a way which is least likely to lead to litigation, even if it may not be the best approach to a particular clinical problem (so called 'defensive medicine').

**(e) *Professional bodies***

Patients may complain directly to the professional bodies concerned: the General Medical Council (GMC) in the case of a doctor, or the General Dental Council (GDC) in the case of a dentist.

**(f) *Community Health Councils***

Community Health Councils (CHCs) represent the views of the consumers to DHAs and, although not directly involved with individual complaints, act as the official watchdog for the local community, inevitably receiving adverse comments. They have no duty to investigate complaints but will usually advise a complainant about which procedure to follow and may attend with him or her at the hearing of the appropriate service committee of the FPC.

Each Council is made up of members with a particular interest in the health services. Half are appointed by the local authorities, one-third by voluntary organizations and one-sixth by the RHA (including at least one trade unionist). Although no upper or lower limit for membership is set, a total of 18–24 members would normally ensure an appropriate representation of local interest.

There is a CHC for each health district (a few have two) and its basic job is to represent, to the DHA, the interests of the public in each health district. Councils have right of access to public information, have the right to visit hospitals and other institutions and have access to the district authority and in particular to the senior officers administering services.

DHAs are expected to consult CHCs when making plans for service developments, particularly where proposals involve important changes or innovations affecting the public. Members of the DHA must meet representatives of its community health council at least once a year. In addition, less formal meetings take place between the authority's members and officers and the CHC's representatives. CHCs publish annual reports and the DHAs are required to publish replies to reports, stating action taken on specific issues contained in them.

CHCs are independent of the NHS statutory authorities. They have a right to be represented by one member at DHA meetings and whilst not allowed to vote, he or she can contribute to the proceedings. Members may also attend FPC meetings by invitation, but have no managerial responsibility for the services.

***Health advisory service***

This service is not involved with the process of complaints from individual patients, but was formed following an unfavourable report on conditions in a mental hospital in Wales in 1969 and is included at this point in the chapter to illustrate another way in which professional

standards are monitored. Teams of doctors, nurses, administrators and other professionals visit hospitals for the mentally ill, mentally handicapped, chronic sick and geriatric patients throughout the country on a regular basis. The team carries out an in-depth study of the hospital arrangements for the care of the patients and considers the complementary community health and social services. The director of the service reports directly to the Secretary of State and to the health authority concerned in confidence. The objective of the service is to encourage good practice, introduce new ideas and foster the formation of effective relationships with other bodies, thus leading to solutions to local problems.

### **Structure of the NHS in Wales, Scotland and Northern Ireland**

There are differences in Wales, Scotland and Northern Ireland in the administrative structure of the Service, although the main principles are the same as in England.

#### *Wales*

There are nine District Health Authorities in Wales which are directly responsible to the Secretary of State for Wales and the Welsh Office, in which there is a section of civil servants dealing with health matters. There is no Regional Authority. The Secretary of State for Wales works closely with the Secretary of State for Social Services in England on health matters. The Welsh Health Technical Services Organization provides services and facilities which are best organized on an all-Wales basis to the district health authorities as well as the Welsh Office. These services include design of major capital buildings, supplies, computer services and pricing of prescriptions.

#### *Scotland*

There are 15 Health Boards in Scotland directly responsible for the planning and provision of health services within their areas to the Secretary of State for Scotland and the Scottish Home and Health Department. The authorities are modelled on the previous English Area Authorities. These Boards delegate the day to day management of the service to teams of officers. Each team consists of four senior officers – the Secretary, the Treasurer, the Chief Nursing Officer and the Chief Administrative Medical Officer – who are known as the Area Executive Group. Each officer has responsibilities as a corporate member of the group, as well as having individual responsibilities for a particular branch of the service. Representatives of consultants and GPs do not join the group. Scotland was not involved in the 1982 restructuring and continues to have districts similar to the old-style English districts. The officer team known as the District Executive

Group consists of the District Administrator, District Medical Officer, District Finance Officer and District Nursing Officer. In Scotland the District Officers are directly responsible and subordinate to the officers on the Area Executive Group and there are no clinical members of the group.

Within the Home and Health Department a section of civil servants, including health professionals, is responsible for health services. There is a Chief Medical Officer, Chief Dental Officer and Chief Nursing Officer for Scotland.

The Scottish Health Service Planning Council works in close association with the Health Authorities to ensure that strategies are devised and implemented on an all-Scotland basis to improve services within available resources. The membership includes representatives from the health authorities, the Home and Health Department and the universities and has an independent chairman appointed by the Secretary of State.

The Common Services Agency provides supporting services which are more appropriately administered on a national basis. They include information, computer services, supplies, buildings, prescription pricing and dental estimates. It also provides the ambulance service and blood transfusion service and has a unit for health education.

Local Health Councils represent the view of consumers in a similar way to community health councils in England.

### *Northern Ireland*

There are four Area Health Boards in Northern Ireland, which unlike other parts of the United Kingdom, have responsibility for personal social services. There is no region and the boards are responsible to the appropriate Minister and the Northern Ireland Office. District Committees act in a similar way to Community Health Councils.

## **FINANCE AND RESOURCE ALLOCATION IN THE NHS**

There was a general belief amongst the architects of the NHS at the time of its introduction that it would be self-liquidating. It was envisaged that a free, comprehensive health service would result in a healthier population, which in turn would have little need for the service. This was set against a back-cloth of a decline in importance of the infectious diseases as the major health problems of the community. The reality was different: as mortality, particularly infant mortality fell, people were more likely to live into adulthood and old age. On top of this, greater affluence led to the adoption of life-styles known to have adverse effects on health. Thus came an increase in diseases associated with modern life-styles and in chronic conditions associated

with an ageing population. The result is that, instead of facing a diminishing burden, modern health services face massive demands for medical care. Neither Britain, nor any other country at the present time, is able to fully satisfy this demand for care.

In its first full year of operation, 1949, the cost of the NHS was about £400 million, but by 1980 the cost had increased to over £11 000 million. The cost per head of the population at the start of the service was less than £10 per annum, but by 1980 it was over £180.

**Table 4.1 General government expenditure\* on different services in the United Kingdom**

Service	Percentage of total expenditure		
	1951	1973	1980
Defence	28	13	13
Housing and environmental services	13	14	9
Social security benefits†	15	20	27
Education	9	15	13
National Health Service	10	11	13
Personal social services†	1	2	2
Law and order	2	3	4
Other	22	22	19
Total‡	100	100	100
	(£4665 M)	(£27 321 M)	(£101 848 M)

\*Central and local authorities including transfer of payment between the two sectors

†Approximations of comparable services have been taken for earlier year

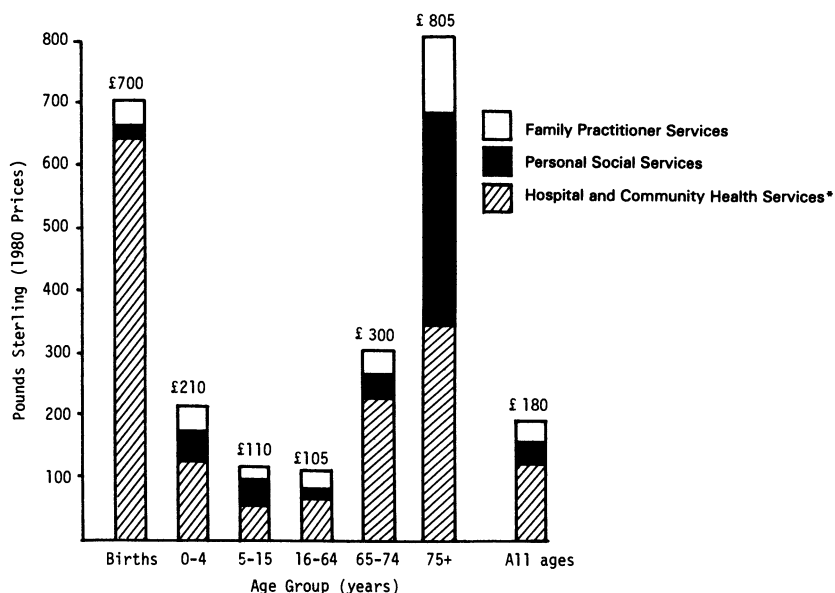
‡Excludes debt interest and non-trading capital consumption

Source: Central Statistical Office (1982 and earlier years). *National Income and Expenditure*. (London: HMSO)

Over the same period the proportion of the gross national product (GNP) spent on health services increased from 4% to about 6%, but this is still lower than that for many developed countries. The proportion of public expenditure on the NHS has remained until recently around 10% (Table 4.1). Although inflation is obviously a major contributor to this increase over time, it does represent a 2½-fold increase in real terms. The increase in the population from 50 million to over 55 million contributed to the rising cost of the health service, but of special relevance is the increased proportion of very elderly people who are high users of services. Figure 4.4 illustrates the relatively large expenditure on services for people at the two extremes of life compared to other ages.

The largest amount of money within the health service is consumed by expenditure on hospitals and the services they provide. In 1950, the





**Figure 4.4** Estimated expenditure on health and social services per head of population 1978-79 (England). Source: Derived from Public Expenditure White Paper (Cmd 8175) London: HMSO.

\*The major proportion of expenditure relates to the hospital service.

*Note:* The Table on which this diagram is based was calculated on net expenditure, so that the total expenditure on the elderly, for example, would be greater because of the effect of exemption from charges such as prescriptions.

hospital service took just over half the NHS budget and by 1980 this proportion had increased to two-thirds, largely at the expense of family practitioner services. Community services have remained as a small proportion of the total (Table 4.2). This is in spite of a greater policy commitment to community care and preventive services. Indeed, many commentators have become concerned that when resources are limited the high technology solutions should still continue to attract the greatest share of what is available. Aside from this inequality between on the one hand 'curative' services and on the other the 'caring' or 'preventive' elements, historical inequalities in the geographical distribution of resources have persisted.

In the years which followed the establishment of the NHS, resource allocation was carried out mainly on the basis of incremental increases in existing provision. Before 1948 there had been a great variation in the type and level of services, in particular localities which did not necessarily reflect greater need for services in the places which were

**Table 4.2 Health Service expenditure on main services in England**

	<i>Expenditure (%)</i>	
	<i>1950</i>	<i>1980/81</i>
Hospitals	55	63
Family practitioner (GPs, dentists, opticians and pharmacists)	35	23
Community health	8	9
Headquarters administration and other services	2	5

Source: Various official publications: data are approximate, especially for earlier years, since definitions have changed

best provided. In the absence of a specific policy to rectify these inequalities they persisted and, although in the 1960s some narrowing occurred, even today discrepancies still exist.

It was in an attempt to bring about fairer distribution of resources that the Government established the Resource Allocation Working Party (RAWP)<sup>2</sup> which reported in 1976. They recommended the use of a formula (the RAWP formula) which sought to redress imbalance by determining allocations on the basis of indicators of 'need' (irrespective of historical precedent) so as to move closer towards equality of access to services for the whole population.

The basis of the formula is to take account of the age and sex structure of each regional population and its standardized mortality ratios (SMRs), standardized fertility rates and patient flow across administrative boundaries to calculate each Region's share of the national resources. Extra increments are recommended for medical-school teaching responsibilities.

The RAWP approach has been criticized, most commonly for the use of the SMR as an indicator of sickness or morbidity. But, as we have seen earlier, the routine data on morbidity within the health service leave much to be desired and it is difficult to see how they could be used as a sound basis for estimating 'need' without major improvements to health information systems. Another criticism has centred on the application of the formula within Regions and there is little doubt that the practice for smaller geographical areas will be the subject of further study. Despite the criticism it has received, the RAWP approach was a bold attempt to correct a legacy of inequality in health service distribution. It is too early yet to judge its success, and it was not implemented at once by all Regions.

The NHS employs nearly a million people, approximately double the number employed in 1949, about 3.5% of the working population and 20% of those with further education; 75% of the cost of the service is for salaries and wages. Nurses are the largest single category of workers

and account for about a third of the total salaries and wages bill. Administrative and clerical staff showed the same steady increase from 1949, which was greatly accelerated following the 1974 reorganization, since when there has been a 50% increase. However, the management costs at around 5% are lower than in the health services of most developed countries. Ancillary staff, on the other hand, have shown a 10% decrease in numbers since 1974, which is against the general trend. Another major notable exception to the substantial increase in the various categories of staff since 1948 has been family doctors (see Table 4.3).

**Table 4.3 NHS staff in England and Wales**

	<i>NHS staff</i>		
	<i>1949</i>	<i>1973</i>	<i>1979</i>
Hospital:			
Medical*	11 500	26 000	32 000
Nursing and midwifery*	146 500	328 500	339 000
Professional and technical*	14 000	41 000	64 000
Administrative and clerical*	24 000	55 000	109 000
Ancillary	157 000	239 000	219 500
General practitioners	17 000	22 500	24 500
Community:			
Nursing and midwifery*	6 000	15 000	25 500
Health visitors*	4 000	6 500	8 500

\*Whole-time equivalents

Source: Various official publications: data are approximate, especially for earlier years since definitions have changed

Part of the increase in the staff numbers stems from changes in hours of work which requires more staff to provide the same services – the same pattern has occurred in employment generally. Part of the increase in the number of administrative and clerical staff has arisen from a conscious policy of freeing professionals from administrative chores, e.g. by providing secretaries for consultants.

## **SERVICES PROVIDED BY THE NHS**

### **Hospitals**

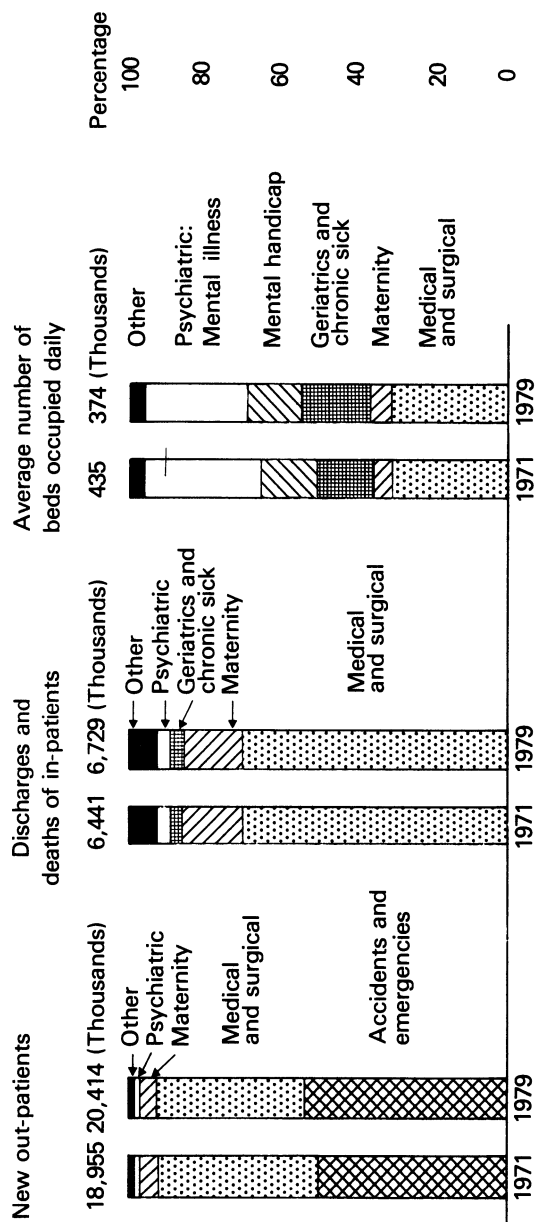
Comprehensive hospital and specialist services are available free of charge at the time of need to all residents of the UK. Except in a proportion of emergencies where the patient goes directly to hospital

(for example, after a 999 call), arrangements for hospital attendance or admission are made by general practitioners. General practitioners can also, if they think it necessary, invite a hospital consultant to undertake a domiciliary consultation with a patient.

During the first decade of the NHS, most of the small amount of available capital resource was spent on maintenance work and new extensions to operating theatres, laboratories and out-patient departments. A few new hospitals were started in the late 1950s, but the first major attempt at forward planning was the publication of the Ten Year Hospital Plan in 1962. A complementary plan for health and welfare published in the following year dealt mainly with staffing requirements of health professionals in the community.

A central feature of the philosophy behind the Hospital Plan was the concept of the District General Hospital (DGH). In recognition of the interdependence of the various medical disciplines and the need to concentrate diagnostic and treatment facilities, the DGH contains a wide range of departments such as medicine, surgery, maternity, paediatrics, psychiatry, geriatrics, rehabilitation and accident and emergency. Such hospitals are intended to provide most of the hospital services for a population of around 200 000. Although there has been some modification of the original idea, the basic concept remains. There has been concern about the size of some of the larger DGHs where problems have arisen in establishing a functional unit. Also, in response to escalating costs, a number of attempts have been made to find a standardized design. The latest version is the nucleus hospital which has about 300 beds, makes economical use of space and equipment and is designed to allow for expansion. The long-term intention is to provide each district with DGH services (not necessarily all on one site), complemented where necessary by smaller community hospitals without highly specialized facilities and staffed mainly by general practitioners. In addition, each Region provides highly specialized services such as cardiac surgery and neurosurgery, usually located in the main Regional teaching centre.

The specialties involved in the treatment of long-stay patients (psychiatry, mental handicap and geriatrics) account for a greater proportion of occupied beds in the NHS than do other specialties, such as medicine and surgery, which make up a higher proportion of all deaths and discharges and new out-patient attendances (see Figure 4.5). In the last 20 years, there has been a more intensive use of hospital services, both in-patient and out-patient. The average number of beds occupied daily has decreased, but the average length of stay for all specialties was reduced from 30 days in 1965 to 21 in 1977. During the same period annual throughput (number of cases treated for an available bed in a year) for non-psychiatric hospitals increased from 23 to 29 in



**Figure 4.5** Hospital statistics by specialty, United Kingdom, 1971 and 1979. Source: Central Statistical Office (1981). *Social Trends*, No. 12. (London: HMSO)

England, although there is still marked regional variation in this latter index.

### *Waiting lists*

Since the inception of the NHS, waiting lists have fluctuated around the half-million mark, but have increased substantially since the early 1970s. There is probably no single explanation for these changes but the ageing of the population, extensions in the range and complexity of surgical procedures and increased frequency of industrial action in the health service are all likely to have been major contributors.

Since 1948 about 90% of the hospital waiting list has been made up of people requiring non-urgent surgery. Although the greatest number are waiting for general surgical treatment, the greatest increase in numbers waiting over recent years has been in orthopaedic specialties (Table 4.4). This has given rise to concern and the establishment of the working party to investigate and report on the problem (Duthie report). Although so-called 'urgent' cases make up a relatively small proportion of the total numbers waiting, the length of time they have to wait has also increased over recent years.

**Table 4.4** Number of patients waiting for in-patient treatment in various surgical specialties, England, 1977-1979

	<i>No. of patients</i>			<i>% increase</i>
	<i>1977</i>	<i>1978</i>	<i>1979</i>	<i>1977-79</i>
Orthopaedic surgery	100 105	112 999	130 949	31
General surgery	161 693	162 430	176 739	9
Ear, nose and throat	98 132	98 172	105 924	8
Ophthalmology	36 625	38 964	43 685	19
Urology	21 191	24 005	26 550	25
Plastic surgery	38 281	41 065	42 949	12
Dental surgery	25 063	26 275	31 241	25
Other surgical specialties	7 964	8 038	8 099	2
All surgical specialties	489 054	511 948	566 136	10
Total numbers	602 000	615 800	725 436	20

Source: Adapted from Department of Health and Social Security (1981). Orthopaedic services: waiting time for out-patient appointments and in-patient treatment: *Report of a Working Party to the Secretary of State for Social Security (the Duthie Report)*. (London: HMSO); and various sources

The term 'waiting list' as commonly used refers to a group of patients who are waiting for hospital in-patient treatment, usually a surgical procedure. A waiting list, therefore, represents an unmet demand for medical services. Demand for medical care may be influenced by a diverse number of factors including the size and structure of the population and the patterns of disease within it, the

quality and quantity of treatment facilities available, and attitudes and style of practice of both hospital doctors and general practitioners. Waiting lists are not, however, restricted to those waiting for operations and can exist at all levels. For example, there may be a delay for a patient waiting to see his general practitioner or there may be long delays for hospital out-patient appointments in specialties (such as dermatology or radiology) where there is no appreciable waiting list for those requiring in-patient care. What really matters to patients is the total waiting time between the appointment being made for them to attend the hospital and the point at which they receive definitive treatment, either as an out-patient or an in-patient. Thus whilst the most pressing problem is the magnitude of waiting lists for in-patient surgical treatment, it should be realized that this is only part of the picture. Furthermore, it is important to note the limitations of waiting-list statistics as a measure of the health of the population. In no sense does a waiting list measure total need. For example, an in-patient waiting list for those requiring total hip replacement because of osteoarthritis of the hip cannot be regarded as a pointer to the prevalence of osteoarthritis of the hip within the community. Nor can it even be assumed to be a reflection of the extent of severe disease in the population.

The size of waiting lists and the length of time individual patients must wait for surgery is one of the most often quoted examples of the supposed failure of the NHS to effectively discharge its responsibilities to the public. Many strategies have been proposed and implemented to reduce waiting lists and waiting time: e.g., the use of pooled admission systems (where arrangements for admission are made at the time of the out-patient consultation); the reorganization of care, e.g. to put greater emphasis on day- or short-stay surgery or (more radically) to increase patient mobility to take account of regional variations in the availability of services. Local initiatives based on some of these approaches have been relatively successful. However, little attention has been given to examine the validity of waiting list statistics through which improvements brought about by such strategies could be measured. For example, many waiting lists are inflated by the presence of patients who have died, or have obtained treatment elsewhere. Moreover, data of waiting lists provide little more than crude 'head counts' and do not provide the sort of detailed clinical or demographic information which would be of real value to the clinician (in the day-to-day running of his list) and the health service planner (in balancing priorities for service development).

### **Family Practitioner Services**

Family Practitioner Services include the general medical practitioner,

general dental, ophthalmic and pharmaceutical services. These professionals are not direct employees of the NHS, but enter into contract to provide all necessary services, hence are often referred to as 'independent contractors'. In England and Wales the contract is with Family Practitioner Committees, but in Scotland and Northern Ireland with the Health Boards.

The Service cost about £150 million in the UK in 1950 and by the late 1970s this had increased by more than ten times (double the cost in real terms). However, during the same period the Family Practitioner Services' share of total NHS spending fell from 35% to 23%.

### *General medical practitioner*

A very high proportion of the population is registered with a general practitioner. Each person may choose his or her own doctor and is free to change: parents choose a doctor for children under 16. The GP is free to accept or refuse a patient, but must give emergency treatment to anyone requiring it. A person who is unable to find a doctor willing to accept him can be assigned to one by the Family Practitioner Committee. A doctor may have up to a maximum of 3 500 patients on his NHS list or up to 4 500 if he is in partnership, provided that the average for each partner is not more than 3 500. There are 24 700 family doctors in Britain, one for every 2 200 people.

A main function of the National Health Service is to ensure even distribution of services throughout Britain. However, this is still far from the case: there are parts of the country which are unpopular, but there is no provision to direct GPs to work there. This is particularly so of the 'inner city' areas, where recent concern has been voiced about the availability and quality of primary medical care, although it has been true for a longer time of industrial areas. Tudor Hart<sup>3</sup> has formulated the 'inverse care law' to summarize the dilemma. He states that the availability of good medical care is inversely related to the need for it in the population in terms of the quantity of sickness and death. In such areas of high needs, general practitioners tend to have a heavier workload, longer lists, and are poorly equipped. In an attempt to redress the imbalance additional allowances are paid to doctors practising in under-doctored areas. This is undertaken by a central committee known as the Medical Practices Committee, appointed by the Secretary of State for Social Services. The majority of members are doctors. Different parts of the UK are classified by the ratio of general practitioners to the population size, taking into account also particular local circumstances. Areas where average list sizes are in excess of 2 500 are referred to as 'designated' and here doctors can usually enter into practice without question and an additional allowance is paid to them. Restricted areas (average list sizes under 1 700), on the other hand, are



those deemed to have sufficient doctors. Applications to practise in these areas would normally be rejected. There are two other classifications: (a) 'open' – where there is an inadequate number of doctors, though not as few as in designated areas, and admission to the medical list is allowed without any additional allowance, and (b) 'intermediate' – where the supply of doctors is not inadequate but each application is considered on merit in the light of local information. As circumstances change, classifications of areas are altered by the Medical Practices Committee, after consultation with the local FPC. General practitioners have rights of appeal to the Secretary of State. These measures have done little to overcome the overall scale of the problem and it is likely that more radical alternatives would be necessary to make any major impact.

In 1948, many GPs who were working part-time in hospitals became consultants and very few of those who remained in general practice had hospital appointments. There was a manpower problem: the surfeit of doctors coming back from the war had led to exploitation of the 'assistants with a view'. In the first 20 years of the service, hospital-based medical practice increased in prestige, whilst general practice declined and morale was low. This process was not helped by Lord Moran's celebrated remark that GPs were those doctors who had 'fallen off the ladder' in competition for the more prestigious hospital consultant careers.

There were additional problems in relation to the method of payment – GPs were paid a flat capitation fee for each person on their list and expenses were disbursed from a 'pool', which was a limited amount of money fixed each year and out of which all extra payments were made. Thus, there was a financial disincentive to improve practice premises and equipment and to employ ancillary staff, for to do so entailed a reduction in personal income.

By the mid-1960s the situation had reached crisis point. The new deal for the general practitioner, negotiated with the government, is sometimes referred to as the 'family doctors' charter'. It introduced a mixed system of payment both by capitation fee and through allowances for specified items. The latter have subsequently been extended to provide the framework of modern general practice. At present general practitioners are paid a capitation fee for each patient (higher for those aged 65–74 years and still greater for those aged 75 years and over). Supplementary fees are paid for 'out of hours' services and there are additional allowances for seniority, having a trainee, emergency treatment, working in group practices and providing items of special service (e.g. contraceptive services and immunization). The rent and rate of practice premises is reimbursed and also a substantial proportion of the salary of ancillary staff. This use of financial

incentives had a dramatic effect on general practice, which has correspondingly improved in organization and status. From the mid-1960s there was also a great expansion in post-graduate education in general practice, pioneered by the College of General Practitioners (now Royal College) culminating in the decision that, from 1982, principals will only be admitted to general practice if they have completed the 3-year vocational training course. A substantial proportion of new graduates now choose general practice as their first choice of career.

The financial incentive also resulted in improvement in practice premises and an increase of doctors working in partnership. Only 17 new health centres were operating in England and Wales up until 1966 but, when doctors were no longer required to pay rent or rates, a major health centre building programme ensued. By 1980 there were nearly 1000 health centres with one fifth of all general practitioners working in them. Thus, at last, one of the major planks on which the NHS was founded was becoming realized. About a third of doctors were single-handed in the early 1960s and by 1980 it was less than 10%. These measures, which encouraged a move towards group practice and innovations by some local authorities in the late 1960s, led to the growth of the concept of the primary health care team which is now a central tenet of government policy. There is wide variation in the range of professionals joining the general practitioner to form such teams, but they often include home or district nurses, health visitors and midwives and, less commonly, social workers.

Even when attachments are not formal, liaison between the GP and these and other professionals is usually the rule. Moreover, most GPs are usually also supported by administrative or clerical staff such as secretaries, receptionists, or practice managers. These additional developments allow them to spend more time on clinical problems and less on administrative matters.

There also has been a reduction in the time spent on visiting and travel (at present 40%) and an increase in the time spent on consultation in the surgery, with over 70% of practices now using an appointments system. Although most GPs enter into contracts with FPCs to provide 24-hour cover to the people registered with them, most do not actually remain 'on-call' around the clock for seven days a week. Instead they arrange duty rotas with other members of the practice or engage the services of deputizing services to provide out of hours cover. Over the past few years such services have come under criticism and recently have become the subject of scrutiny to ensure that standards are maintained.

### *General dental services*

Patients may choose their own general dental practitioner who is free

to accept or refuse a patient. Unlike a general medical practitioner a dentist has no obligation to provide continuing care for his patient. Each series of treatment is a separate exercise. The general dental service itself has seen only a small expansion since the inception of the NHS. The number of dentists per 10 000 of the population increased from 22 to 25 between 1951 and 1977. About 12 000 dentists currently work in the general dental service in the UK. The proportion of the National Health Service budget consumed by general dental services is less than 4% and has been steadily falling; it was 6.5% in 1959. This is in part due to a higher proportion of charges being borne by the patient.

The Dental Estimates Board which is appointed by the Secretary of State and includes dental practitioners, must give approval to extensive and prolonged dental treatment carried out on a patient before payment can be authorized. However, for most routine dental work a dentist does not have to seek any outside authorization.

### *The general ophthalmic services*

The general ophthalmic services undertake sight testing and the supply and replacement of spectacles. About 43% of the population wear spectacles and change them once every three years. When there is a disease of the eye present (e.g. cataract), the patient is referred by the family doctor to the hospital ophthalmic department. There are three groups of professionals involved in providing general ophthalmic services. Ophthalmic medical practitioners are doctors who test sight and prescribe lenses; ophthalmic opticians test sight, prescribe and also supply lenses, but are not doctors; and dispensing opticians supply spectacles on prescription. In the UK, there is freedom of choice for the person requiring spectacles. Virtually all sight tests are performed under the NHS. A range of spectacle frames is available under the NHS at standard charges and a larger range of more expensive frames is available to those who wish to pay privately; many do so. Charges are also made for lenses. The services account for only about 1% of the total NHS expenditure and the figure is roughly half, in real terms, what it was when the NHS first started; again this is largely explained by the increased contributions made by patients.

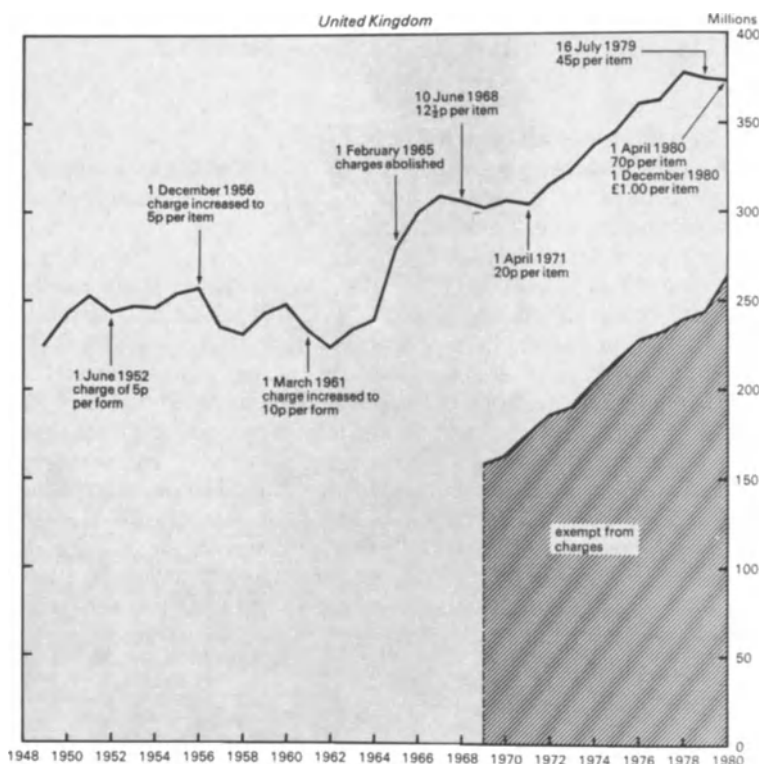
### *Pharmaceutical services*

Most prescriptions by general practitioners to patients are dispensed by retail pharmacists; a few doctors in rural areas do their own dispensing. Nearly all chemist shops in the UK take part in the NHS. They are required to have their pharmacies open at reasonable hours and in most

places operate a rota system for evenings and weekends.

The cost of the pharmaceutical service has been approximately 10% of the total cost of the NHS since 1948. The number of prescriptions has increased from about 200 million in 1949 to 374 million in 1980 (Figure 4.6), with the main increase since the early 1960s. Changes in prescription charges have in general tended to have only a temporary effect on demand. In any event over two thirds of all prescriptions are exempt from charges because they concern children under 16, expectant mothers, people of pensionable age and those on low income.

There are probably a number of reasons why there has been an increase in prescriptions, but the increase in the proportion of elderly



**Figure 4.6** Number of NHS prescriptions dispensed. Source: Central Statistical Office (1981). *Social Trends*, No. 12. (London: HMSO).

people, who are high users of the service, must be partly responsible. The largest increase in prescriptions in recent years has been for tranquillizers, anti-hypertensives and oral contraceptives (since the introduction of the free family-planning service). There has been a decline in prescriptions for antibiotics, expectorants and vitamin preparations.

### **Private medicine**

When the NHS was first introduced private medicine underwent considerable contraction. Since then there has been a slow but steady growth in the numbers of subscribers to private medical insurance schemes which cover treatment in private hospitals or NHS pay beds (see Table 4.5).

**Table 4.5** Subscribers to private patient schemes

<i>Year</i>	<i>No. of subscribers</i>
1950	125 000
1955	590 000
1960	1 000 000
1965	1 500 000
1970	2 000 000
1975	2 300 000
1976	2 250 000
1977	2 140 000
1978	2 380 000
1979	2 760 000
1980	3 500 000

There was a large increase in these numbers in 1979/80 and although the reasons for this are not known it is thought that the industrial troubles of the winter of 1978–1979, which affected health service waiting times, played a role.

In 1981 there were about 32 000 beds in private hospitals and nursing homes: some 23 000 of these were long-stay beds, mainly for elderly people. In addition there were about 2500 ‘pay-beds’ in NHS hospitals.

### **The control of medicines**

With the increase in new pharmaceutical products in recent years there has been growing concern about the safety and side-effects of medicines.

The legal basis for monitoring and control of therapies for both human and animal use is the Medicines Act 1968, which brought together a number of previous pieces of legislation. The Act is the

responsibility of both the Department of Health and Social Security (DHSS) and the Ministry of Agriculture, Fisheries and Food. Since the Act originally came into force regulations, orders and information leaflets have been issued by government departments on various aspects of the control of medicines.

The responsibility for control of medicines has a wide variety of aspects. A licensing system governs the marketing, manufacture, import and wholesale distribution of 'medicinal products'. Criteria are laid down for what constitutes a medicinal product and powers exist to extend the definition. This has already been carried out for many substances, e.g., in relation to surgical suture material, dental fillings, and contact lenses. The licensing system also covers the issue of new medicinal products for the purposes of conducting clinical trials to evaluate a new therapy in human beings. Medical and dental practitioners may be exempt from the licensing procedure in so far as they still have freedom to prescribe unlicensed products for their patients under certain circumstances. The question will hardly ever arise since the majority of practitioners will be prescribing medicinal products which ultimately derive from a manufacturer or supplier who will himself hold a licence under the regulations. However, a doctor or dentist may import a medicinal product without licence provided that it is to treat a specific patient and not to build up a stock for general usage. He may also manufacture (make up) an unlicensed medicine for an individual patient and maintain a small stock.

Aside from licensing, other aspects of control include: registration of pharmacies, promotion and advertising (both to the medical profession and the public), post-marketing safety surveillance, and labelling of packages and containers. There is no facility for price regulation under the Act. The Secretary of State for Social Services administers this control machinery through the Medicines Division of the DHSS which is staffed by doctors, pharmacists, scientists, lawyers as well as administrative and clerical staff.

The Medicines Division's main functions include:

- (a) direct involvement with all aspects of licensing;
- (b) providing an inspectorate to make sure that the Act is enforced;
- (c) monitoring and reporting adverse reactions to medicinal products (together with the Committee on the Safety of Medicines);
- (d) international liaison, particularly through the World Health Organization and the European Economic Community.

The Act allowed for the establishment of a Medicines Commission. Members from the relevant professions are appointed by the Secretary of State and advise him in relation to the execution of the Act. Upon

the recommendation of this Commission the Secretary of State has established a range of expert committees to provide advisory functions on specific topics. At present (in addition to the Medicines Commission itself) there are six such expert standing committees providing advice to the Minister:

- (a) The British Pharmacopoeia Commission (responsible for producing future editions of this volume).
- (b) The Committee on Safety of Medicines (CSM) was established as the Committee on Safety of Drugs prior to the 1969 Act and now aids licensing by providing detailed advice on safety and effectiveness of new products (mainly those on the market since 1976) and also by co-ordinating reports of adverse reactions to existing products.
- (c) The Committee on the Review of Medicines gives advice on information it receives concerning the safety and effectiveness of products, marketed mainly before 1976.
- (d) The Committee on Dental and Surgical Materials considers products outside the remit of the CSM, such as surgical sutures, dental products, intrauterine devices and contact lenses.
- (e) The Committee on Radiation from Radioactive Medicinal Products advises on drugs that are specifically radioactive.
- (f) The Committee on Radioactive Substances Advisory Committee, unlike the other Committees does not advise so much on products but vets potential handlers of isotopes and decides whether or not to grant a certificate entitling people to do so.

Many of these standing committees have themselves established expert subcommittees to deal with individual aspects of their overall responsibility.

The Adverse Reactions Sub-Committee of the CSM is particularly important in that it involves members of the medical profession directly in the process of detecting untoward reactions from drugs. This is undertaken through the 'yellow card' system, through which individual medical practitioners can report a suspected adverse reaction in an individual patient. The CSM then maintains a confidential register of such information that it has obtained from this and other sources. An example of the value of this system of reporting is provided by the events which led (in August 1982) to the suspension of the anti-inflammatory drug Opren (benoxaprofen). The CSM had received more than 3500 reports of adverse reactions to the drug, including 61 deaths, mainly in the elderly. The suspension of the product licence was made (initially for three months) under the terms of the Medicines Act, 1968.

Thus there is a vast and complex machinery to maintain and control this importance practice. The doctor actually carrying out the prescribing, whether he is based in hospital or in general practice, has a number of channels through which he may learn about the efficacy of various alternative therapies, and their potential hazards and side-effects:

- (a) *From pharmaceutical companies* – either directly from medical representatives of the companies concerned, via advertising in medical journals or by advertising literature mailed to him.

As this is the major source by which medical practitioners acquire information about medicinal products and because of the large sums of money at stake in the drug industry, there has been concern about the potential for pharmaceutical companies to make unjustified or misleading claims about the efficacy of their products. Control on standards in advertising to the professions is maintained through regulations issued in accordance with the Medicines Act 1968. Aside from these safeguards, the system of data sheets is also an attempt to prevent biased information about a product being put across to a practitioner. It is a legal requirement that at least 15 months before any advertisement or promotion (either written or oral) of a product is undertaken, a standard data sheet must be sent to the practitioner setting out objectively full details about the product. In addition to this, a Data Sheet Compendium is published by the Association of the British Pharmaceutical Industry and mailed free of charge to all medical practitioners and pharmacists. It contains data sheets from many of the products on the market, so that details of dosage, route of administration, contra-indication, markings, side-effects and other details are available in one volume. Another publication which contains brief data on many drugs and is produced by a commercial organization and sent regularly to doctors is the Monthly Index of Medical Specialties (MIMS). This also contains advertising material.

- (b) *Drug Information Services* – most health authorities provide a hospital-based service staffed by pharmacists with special expertise to maintain and provide information on drugs and medicines from a number of different perspectives including indications, relative merits, efficacy, side-effects, safety and costs. This impartial advice or information is open to all medical practitioners, pharmacists or other relevant professionals working within the District.
- (c) *British National Formulary (BNF)* – this is produced by the medical and pharmaceutical professions and is brought up-to-date and sent without charge to doctors and pharmacists within



the NHS every 6 months. It is orientated towards the treatment of specific disorders and thus provides an impartial opinion on indications for, and the relative merits of, various alternative therapies.

- (d) *The medical literature* – articles in the medical journals will report clinical trials of new or existing therapies for particular conditions, as well as reporting potential side-effects. Some more specialized journals deal specifically with prescribing.
- (e) *Postgraduate education or training* – in the course of study for postgraduate examinations or through attendances at lectures and seminars many practitioners will keep abreast of recent developments in therapeutics.

### **Community services**

The services provided by the health service in the community are complementary to those provided in hospitals and by the local authority social services departments. Many such services are now organized around general practice as a primary health care team.

The components of the community services provided by the NHS to individual patient/client groups are discussed elsewhere. For example, the health visitor and the district nurse (child health and the elderly – Chapters 6 and 8); the midwife (maternity services – Chapter 6); the provision of infant and child welfare services and the school health and dental services (child health – Chapter 6); immunization and health education (prevention – Chapter 3).

Chiropody is another community service which district health authorities have a responsibility to provide. Chiropody services may be available in hospitals, clinics, old people's homes or other local authority premises. Sometimes chiropodists work in their own surgeries and in many districts there is a domiciliary service if the patient is housebound. It is a particularly important service for the elderly and physically handicapped in maintaining mobility.

### *The specialty of community medicine*

The re-organization of the NHS in 1974 introduced the new specialty of community medicine and considerable emphasis was placed on its potential contribution. Community physicians are registered medical practitioners who have a responsibility for the health of a defined population rather than for individual patients. The main component of their job is to recognize and analyse the health problems of the population and to bring to bear the services to prevent or deal with these problems.

Over 80% of the community physicians who joined the new specialty

in 1974 had been working in the Public Health Service of local authorities, either as medical officers of health, their deputies, or senior medical officers. These doctors had been concerned with aspects of preventive medicine (including infectious disease control) and with the management of community health services including health visiting, home nursing and chiropody. Most of the remainder of the new community physicians were recruited from the medical administrative staff of Regional Hospital Boards, where they had been responsible for planning and administration in the hospital service. The specialty also includes medical officers working in central government and academic medical staff in university departments of community medicine, epidemiology or social medicine. The latter group, in addition to teaching and research, usually also have honorary contracts as community physicians within the NHS.

The Royal Commission on Medical Education (the Todd Report) reported in 1968 that community medicine should be recognized as a specialty in its own right and defined it as "the specialty concerned not with the treatment of individual patients but with the broad questions of health and disease in . . . sections of the community and in the community at large." In addition to recognizing the importance of this subject to the medical undergraduate curriculum, the Commission recommended specialist training for doctors wishing to make a career in this field, the main purpose of which would be "to give the trainee the necessary analytical and investigative skills to enable him to perform his tasks of medical care evaluation, planning and organization".

*Education and training.* The Faculty of Community Medicine within the Royal Colleges of Physicians was founded in 1972. Initially doctors already working in the branches just described were admitted as foundation members or fellows without examination, provided that they met certain criteria of qualifications and experience.

Since then members have been admitted by examination and must undergo higher specialist training before they are accredited as community physicians. The Faculty has about 2000 members.

*Titles.* The generic title for all doctors working in the specialty in England and Wales is 'community physician'. They comprise two groups:

- (a) Regional and District Medical Officers who are members of the Regional Team of Officers and District Management Team respectively, and
- (b) all others not filling these posts but working at the consultant

equivalent level in the NHS who are termed Specialists in Community Medicine.

*Range of work.* The tasks of the community physician include:

- (a) helping in the assessment of local needs for the health services;
- (b) analysing and developing services;
- (c) liaising at all levels with other relevant disciplines;
- (d) promoting and co-ordinating research and development;
- (e) providing advice and services for the environmental health, personal social services, housing and education to relevant local authorities.

No community physician is responsible for individual clinicians working in hospitals.

The Regional Medical Officer heads a team of Specialists in Community Medicine who are, through him, accountable to the RHA. He is accountable for the work of the Regional Scientific Officer, and monitors and co-ordinates the work of the Regional Pharmaceutical Officer and medical aspects of the Regional Ambulance Officer's work. He has a corporate responsibility as a member of the Regional Team of Officers.

The District Medical Officer is the co-ordinator of planning teams at district level. He plays an important part in the process of hospital/community integration, is responsible for the implementation of preventive services and advises on environmental health matters for the local government authorities in his district. He has corporate responsibility as a member of the DMT.

The Specialist in Community Medicine may be employed at either regional or district headquarters. The numbers employed vary according to the work of the particular authority. Their responsibilities at Regional level include:

- (a) Planning and monitoring health care services.
- (b) Health-care information services and research.
- (c) Personnel work for medical staff, including post-graduate medical education and manpower planning.

At district level, the responsibilities include:

- (a) Health care planning and information services.
- (b) Child health (including school health services).
- (c) Services (including those for the mentally disordered, elderly and physically handicapped), the planning and delivery of which requires close collaboration with local government social services departments.

- (d) Environmental health and housing.
- (e) Personnel work for medical staff.

A detailed survey of the work of the Community Physician in England in 1971 found that administrative tasks accounted for 60% of their time at work (Table 4.6). This large administrative load was not an unexpected finding in view of the position of the Community Physician in a complex organization.

*Numbers in post.* Community medicine is one of the shortage specialties, with only 500 community physicians in posts in England and Wales in late 1982.

**Table 4.6 Percentage distribution of task time by task (the work of community physicians)**

<i>Task</i>	<i>% Task time</i>
Administration	60
Staffing	8
Developmental	6
Accommodation	2
Medical	2
Financial	1
Public	1
Multiple	13
Routine	27
Planning	14
Preventive medicine	9
Education	5
Local authority	5
Negotiation	2
Investigation	2
Clinical	1
Interpretation	1
Total	100

Source: Donaldson, R.J., and Hall, D.J. (1979). The work of the community physician in England. *Community Med.* 1, 52-68

## Other services

### *The National Blood Transfusion Service*

This service is managed by RHAs who must ensure that there is an adequate supply of blood for the needs of their region. Each region has a medical director who has overall charge of the service. A regional centre is staffed by technicians, administrators and others who maintain and service a panel of blood donors and store blood in a network of blood banks mainly based in large hospitals.

***Mass Miniature Radiography Service.***

This service played a major role in the screening programmes to detect tuberculosis after World War II. Since the diminution in the number of cases of tuberculosis the service has been greatly reduced in size. It is managed by RHAs and most regions have both static and mobile units.

***Office of Population Censuses and Surveys (OPCS)***

The OPCS is the main government agency for collecting, analysing and disseminating population and health statistics. It is not part of the NHS, but has an important relationship with health and social services and is referred to in various places in this book. The DHSS also has responsibility for health service statistics and for sickness absence returns. The OPCS was formed in 1970 when the General Register Office and the Government Social Survey were brought together as one department. It is headed by the Registrar General who is not usually medically qualified, but medical staff work in the organization and the most senior post held by a doctor is the Chief Medical Statistician.

The headquarters of the OPCS is in London, but it is concerned with the local offices for the registration of births, deaths and marriages and with the central register of NHS patients at Southport.

The functions for which the OPCS is responsible include:

- (a) registration of births, deaths and marriages;
- (b) maintenance of the central register for the NHS;
- (c) a wide range of demographic statistics including national, regional and local estimates of population: birth, marriage and fertility statistics: population structure by sex, and age and migration;
- (d) the conduct of decennial and other censuses of the population;
- (e) statistics of mortality and morbidity (sometimes jointly with the DHSS);
- (f) the General Household Survey and other surveys on a wide range of subjects.

***Use of Health Services***

The fact that some groups within the population place a greater demand on services than others has been discussed at various points elsewhere: the elderly, for example, because of their particular problems are disproportionately high users of the service. The related issue of unequal provision of, or access to services has been discussed in relation to the allocation of resources.

Recently, attention has been focussed on the question of whether subgroups of the population use the services to a level commensurate with their need for them (in terms of the amount of illness they

experience). This argument centres on the use made of services by different social groups.

There has been much theoretical discussion about what leads an individual with a symptom or symptoms to seek help – illness behaviour. Central to this process seems to be the individual's perception of the seriousness of the health problem weighed against his perception of the benefits of seeking help and the difficulties or obstacles to obtaining it. These in turn will be influenced by a wide variety of factors, including the sick individual's upbringing, level of education, job and social circumstances, level of anxiety and fear, advice or reaction on the part of the family or friends, as well as wider issues such as the nature of the society or culture in which he is living. This complex network of factors has been put into a theoretical framework in the so called 'health belief' model of health behaviour, shown in Figure 4.7 in relation to taking up preventive services.

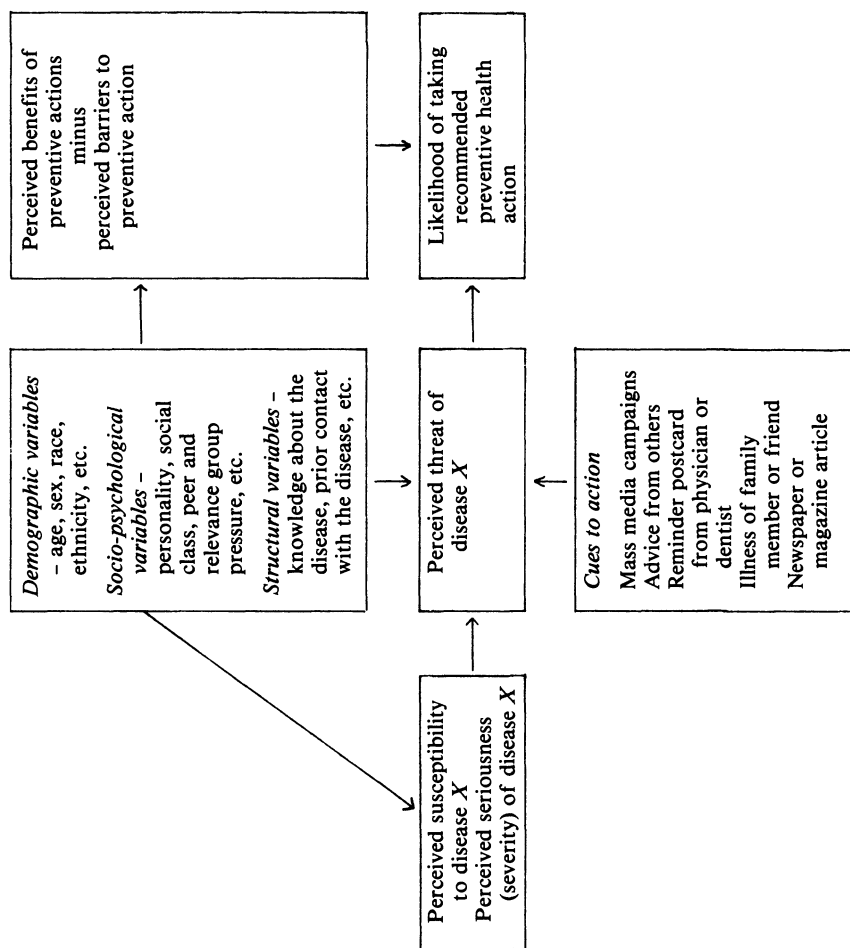
Little routine data are available within the NHS to examine use of health services in relation to these variables, but starting at the simplest level some data have been examined in relation to social class. Because occupational data are not collected on hospital in-patients or general practice consultations, utilization rates by class are not measurable and special surveys of these issues have produced conflicting results.

The position with regard to preventive services, however, appears to be much more clear-cut. The evidence suggests that preventive services are taken up more often by middle-class people than by working-class people. For example, a smaller proportion of women in Social Classes IV and V came forward for cervical cancer screening in Manchester

**Table 4.7 Percentage of women of all ages in each social class in 1966 sample census and in two populations of screened women**

<i>Social class</i>	<i>1966 census (NW region less Merseyside) (%)</i>	<i>1965 profile of screened women (n = 5000) (%)</i>	<i>1968 analysis of screened women (n = 34 851) (%)</i>
I	2.6	6.5	7.7
II	15.5	19.3	20.1
III	48.2	57.3	57.0
IV	25.4	10.6	11.1
V	8.3	6.3	4.1
Total	100.0	100.0	100.0

Source: Sansom, C. D., Wakefield, J. and Yule (1970). Cervical cytology in the Manchester Region: changing patterns of response. *Med. Officer*, 123, 357-359



**Figure 4.7** The health belief model as a predictor of preventive health behaviour. Source: Becker, M. H. *et al.*, (1977). Selected psychosocial models and correlates of individual health and related behaviours. *Med. Care*, 15, 27-46

than might have been expected, given the known social-class structure of the population at the census (see Table 4.7).

This problem of apparent under-utilization of a service by the lower social-class groups is made more serious when it is recalled that cervical cancer (the disease for which the preventive service is being mounted) is markedly more common in working-class women than middle-class women.

It appears that in the field of preventive medicine those groups most in need of a service are the same ones who use it least. A similar picture is seen with other services. For example, in relation to antenatal care, Social Class V mothers (who are at greatest risk in terms of fetal loss or abnormality) are more often 'late-bookers' than are their Social Class I counterparts (Table 4.8). Although in this Scottish study there was a trend towards earlier booking over a short period of time, the social class differential persisted.

**Table 4.8 Late antenatal booking - Percent of married women in each social class making an antenatal booking after more than 20 weeks of gestation (excluding women whose date of last menstrual period is uncertain), Scotland 1971-1973**

<i>Social class</i>	<i>Late bookings (%)</i>		
	<i>1971</i>	<i>1972</i>	<i>1973</i>
I	28.4	27.2	27.0
II	35.3	32.3	29.8
III	36.3	33.4	30.6
IV	39.3	37.8	35.3
V	47.1	44.2	40.5

Source: Brotherston, J. (1976). The Galton Lecture: 1975 - Inequality: is it inevitable? In Carter, C. O. and Peel, J. (eds.) *Equalities and Inequalities in Health*. Proceedings of the Twelfth Annual Symposium of the Eugenics Society. (London: Academic Press)

These problems are not easily resolved because of the complexity of factors which may influence health-related behaviour. It raises questions, however, to do with not only the availability of services but also their organization and delivery. Some would hold the view that health services in Britain, with their high-technology, professionalized and centralized structure, strongly favour the middle-class consumer who in general is more able to organize his daily routine to fit in with diverse commitments, travel to appointments, be aware of and find his way through a complex organization of services and, at the end, articulate his



problem and communicate it to a middle-class professional.

Alternative ways of organizing and delivering care such as mobile health clinics, flexible appointment systems, evening and weekend opening of clinics have been, and are being, tried in an attempt to positively discriminate in favour of those most in need. There is no one easy answer, but if it is accepted that health services can have an effective role in reducing inequalities in the distribution of death and disease, then this is one of the many issues which will have to be addressed in the future.

## **CENTRAL AND LOCAL GOVERNMENT**

### **The process of law making**

Although a considerable proportion of English law is case-law (sometimes called Common Law) which has been derived by setting precedents in court cases, as far as the health and social services are concerned, the powers for providing services are derived almost entirely from Acts of Parliament – Statute Law. The process of law making is complex and only a brief outline is described in order to provide a basic understanding of the procedure.

An underlying principle of modern British democracy is to seek to obtain wide agreement on proposed legislative changes. It is often the practice nowadays to promote wide discussions on a major social issue before introducing it to Parliament. There are several methods for achieving this.

The appropriate Minister may issue a discussion paper, in the form of a 'Green Paper' or consultative document, in which he invites comments within a specified period of time. The next step may be a 'White Paper' which makes firm proposals for changing the law, having taken into account the results of the consultative process; or the firm proposals may be in a Parliamentary Bill. For example, two Green Papers, a consultative document and a White Paper preceded the NHS Reorganization of 1974. Alternatively, the Minister may appoint a Committee or, if the issue is of sufficient importance, a Royal Commission to collect information, interview witnesses, sift evidence and produce a report with recommendations. On the basis of such reports, the Minister may accept some or all of the recommendations and set out an outline of proposed changes in legislation as a White Paper. This sequence of events occurred, for example, when the Report of the Committee on the Allied Personal Social Services (The Seeborn Committee) was followed by the Local Authority Social Services Act 1970.

When the Government's final proposals are ready, they are put into a Bill which is introduced to Parliament with a copy to all Members;

this is referred to as its first reading. The second reading of the Bill involves discussion of the main points and, if approved, it is referred to a committee of Members of Parliament which considers the Bill clause by clause (as each paragraph is termed). This takes place either in a committee room or as a 'Committee of the whole House' in the House of Commons Chamber. The Bill is then returned with any amendments for a further debate in which amendments can still be proposed; this is referred to as the Report stage. After a third reading it passes to the House of Lords for a similar procedure before it is finally submitted to the Queen for Royal Assent.

An individual Member of Parliament may introduce a Bill – a Private Member's Bill. An example in the field of social legislation is the Chronically Sick and Disabled Persons Act of 1970, which was introduced by Mr Alfred Morris MP. Less commonly, Bills can be introduced first in the House of Lords.

After receiving the Royal Assent, the Bill becomes an Act and the paragraphs that were previously called clauses are now referred to as sections. It is customary for the Act itself to be concerned only with broad principles; powers are given to an appropriate government minister to make regulations and orders (subordinate regulations) dealing with the detail. It is important to realize that these regulations carry the same force in law as if they were part of the Act from which they are derived. However, ministers can only make law in this way within limits laid down by the original Act. Regulations are subject to Parliamentary procedure, but this is much quicker and simpler than the elaborate and lengthy procedure that most Bills go through on their way to becoming Acts.

Thus a flexible means of law making is available to meet changing and unforeseen circumstances. In addition, the Minister may issue circulars or memoranda on the subject of the Act. These are not legally binding, but in practice are usually implemented by health and local government authorities. Some legislation, particularly in relation to local authorities, makes powers available but does not make it a duty to implement them. The term 'permissive' legislation is used in this context.

### *Organization of Central Government*

Central government carries out its functions through departments and ministries which endeavour to translate policies and laws into action. Both are headed by a politician appointed by the Prime Minister, departments by a Secretary of State and ministries by a Minister. The appointment may be terminated or the Minister moved to another post in a so-called government 'reshuffle'. Political heads of departments also change if the government is voted out of office at an election.

Periods of tenure for such heads of government departments are thus normally quite short. Departments are staffed by permanent civil servants whose tenure of office is not affected by political change. The chief civil servant in the department is known as the Permanent Secretary and, on behalf of the Minister or Secretary of State, is responsible for the administration of the particular department.

The functions of the DH in respect of the NHS are described in a previous section, but this large government department has much wider functions. It was formed in 1968 by combining the Ministry of Health and the Ministry of Social Security. The political head, who has a seat in the Cabinet and is accountable to Parliament, is called the Secretary of State for Social Services. The junior ministers are a Minister of State and a Parliamentary Under-Secretary of State on the health side of the Department, a Minister of State and a Parliamentary Under-Secretary of State on the social security side and one Parliamentary Under-Secretary who has duties on both sides of the department. The administrative civil servants are headed by the Permanent Secretary and medical staff by the Chief Medical Officer. He or she acts in a similar capacity for the Department of Education and Science, the Home Office and advises on medical matters for the Department of the Environment and the Ministry of Agriculture, Fisheries and Food. Other professional staff who work in the DH include dentists, nurses, social workers and pharmacists. The health side of the DH also supports and monitors local authority social services departments. On the social security side the chief official is known as the Second Permanent Secretary. In addition to the staff who help Ministers to make policy, this side of the department is also responsible for making provision for the payment of benefits and allowances through about 500 local offices.

Other central government departments besides the DH have health-related functions. The Department of the Environment has areas of responsibility which impinge on health such as atmospheric pollution, water supply, sewage, and housing. The Ministry of Agriculture, Fisheries and Food deals with diseases of animals, food hygiene and standards of nutrition. The Department of Employment has duties in ensuring the health and safety of people at work. The Department of Education and Science, though no longer responsible for the school health service, maintains a general interest in the health of school children.

Certain statutory bodies created by Acts of Parliament have functions which are also of relevance. The General Medical Council is one. It was created by an Act of Parliament and has duties and responsibilities for the registration and control of the medical profession. Statutory bodies of this kind must be clearly distinguished from other

organizations such as the British Medical Association, which is a professional association concerned with safeguarding the interests of its members as well as expressing opinion. Membership of such an association is voluntary and does not confer the right to practise as does the statutory body (the General Medical Council).

### **Organization of local government**

Local authority services, particularly education, environmental health, housing and personal social services, have an important bearing on the NHS, so a brief account is given here of the structure and function of local government.

A radically reorganized system of local government for England and Wales outside London was introduced on 1 April 1974, to coincide with the NHS changes. Local government in London already had been reorganized in the mid-1960s and underwent no further change in 1974. The pattern of local government in England and Wales had been laid down in the previous century and although some changes had taken place there had been no major reorganization to meet modern needs. There were over 1300 directly elected local authorities in England, with approximately 700 having populations of less than 20 000. Thus many of these small authorities had insufficient work to justify the appointment of specialists and there was a need for a fundamental revision of the distribution of functions between different kinds of authorities.

For years, local government authorities had been involved with health, as described earlier. Although responsibilities for the hospital service ceased in 1948, they continued to have a major role providing community and preventive services. In 1974, still more health functions were taken over by the NHS and all doctors and nurses working in local authorities were transferred to the health service. However, environmental health officers and social workers remained with local authorities. Arrangements were made for medical advice to be given to local authorities by health authority officers as necessary and for social work services in hospital to be provided by local authorities.

In England and Wales (excluding Greater London) in 1974, the number of local government authorities was reduced to just over 400. New-style county councils were created and below them was a second tier of 369 district councils. The number of districts in each county varied between 2 and 19. In 1986 the six metropolitan counties and the Greater London Council were abolished by Parliament. Most of their functions were taken over by the London Boroughs and Metropolitan District Councils. These 36 provincial highly urbanized Metropolitan Districts have responsibilities which include education, personal social services, environmental health and housing. The remaining non-

metropolitan counties may encompass large towns or cities as well as their surrounding rural areas. Their functions include education and personal social services. The district councils within these counties have populations of 40 000 or more and have responsibility for environmental health and housing. Each non-metropolitan county and each metropolitan district has one or more matching district health authorities.

The 32 London Boroughs and the City of London which were unaffected by the 1974 changes have similar matching health authorities. Each of the outer London boroughs is responsible for four complementary local government functions (social services, housing, environmental health and education), but the inner boroughs do not provide education services which is the responsibility of the Inner London Education Authority (Table 4.9).

**Table 4.9 Local government functions related to the NHS from 1986 (England)**

<i>Functions</i>	<i>Non-metropolitan</i>		<i>Metropolitan</i>	<i>London</i>
	<i>County Councils</i>	<i>District Councils</i>	<i>District Councils</i>	<i>Borough Councils</i>
Education and social services	Yes	No	Yes	Yes*
Housing and environmental health	No	Yes	Yes	Yes

\*Education in the Inner London Boroughs is the responsibility of the Inner London Education Authority

*Note:*

Many of the district councils retain their titles such as borough or city councils but this does not affect their functions

Close links are necessary between health and local government authorities; it is therefore a statutory requirement to have a local Joint Consultative Committee whose membership is drawn from both authorities. It plans and advises on the planning matters and the operation of services in spheres of common concern to health and local government. The Joint Consultative Committee makes its views known to its parent bodies and these views may be published. Discussions of the Joint Committee generally lead to agreement being reached between authorities, but there are arrangements under which an authority can seek the help of central government on any matter where this is not possible.

In addition to the Joint Consultative Committee a further link is

provided by the fact that each DHA includes in its membership members of related local authorities. Moreover, local authorities are strongly recommended to co-opt to their relevant committees members or officers of health authorities.

### *Joint Financing*

In brief, joint financing is the use of 'earmarked' DH funds, distributed through the NHS, for local authority projects which will be of benefit to NHS patients. In England, since 1976, a system of joint financing of projects, principally the responsibility of local authorities but also of benefit to health authorities, has been operating. They may be capital or revenue in nature, but, if the latter, the local authority is required, by stages over an agreed period of years, to assume full financial responsibility. Funds for the schemes are provided by the DH through a stipulated allocation to health authorities, and are distributed by them for jointly agreed, specific local authority projects. These projects are those which are judged as likely to make a better contribution, in terms of total care, than if funds and responsibility were given directly to health authorities. This, essentially 'pump priming' activity, may enable a local authority to provide its part of an overall joint plan; e.g. a Special Training Centre as component of a Mental Handicap Service.

In this example, the whole of the capital cost of the centre and the first year's running costs might be drawn from joint finances, the annual contributions of the local authority towards the running costs would increase over a period of (say) 5 years until it was meeting the total revenue outlay.

Virtually all the projects undertaken so far under this scheme have been for social service enterprises, sometimes involving voluntary organizations. About 40% of the funds have been spent on provisions for the elderly and 33% in services for the mentally handicapped.

The Joint Financing Scheme has provided Joint Planning with uncommitted funds and has greatly helped in bringing about closer co-operation between health services, local authorities and voluntary bodies. As intended, it has also enabled local authorities to transfer more care to the community. However, some local authorities have been reluctant to participate in joint finance projects, partly because of an unwillingness to incur the long-term financial commitments which arise when they have to assume total responsibility for the running costs.

### *Operation of local government*

The population of each County and District elects representatives (councillors) to the Parliamentary Franchise (virtually everyone over

the age of 18 can vote). The full Council of a local authority (either county or district) consists of all elected councillors and acts as a corporate body with responsibility for providing services in a locality. It elects a chairman, who in some authorities is known as the 'Mayor'. In order to discharge its functions the Council defines its duties and divides into service-orientated committees, each of which elects a chairman. It is a statutory requirement to establish committees for education, social services and the police. Aside from these it is for each Council to decide which other committees it thinks necessary.

A number of Chief Officers are appointed to head departments and provide the services for which they are responsible. In local government the chief officer is a manager of all staff in his department, irrespective of their discipline. Local authorities are free to determine the numbers and categories of staff they appoint to carry out their functions, although they must appoint a Chief Education Officer, a Director of Social Services and a Chief Constable (if these officers are appropriate to the duties of the Council). The chief officer of the department is then responsible to a Committee of elected members: the Director of Social Services, for example, is responsible to the Social Service Committee. Council and Committee meetings are required by law to allow the public and press access to council affairs. To ensure co-ordination between departments, most authorities form their chief officers into corporate management teams under the chairmanship of the chief executive officer in his role of *primus inter pares* (first amongst equals).

This management team considers matters concerning the authority as a whole, not just individual departments, and usually reports to a major committee which has responsibility for policy and resources.

It will be noted that in 1974 local government (unlike the NHS) was given much more freedom at local level to determine the way in which it discharged its responsibilities.

### **Relationship between local and central government**

Local government derives its powers to provide services from Statute Law. Legislation can be either mandatory (making it a duty) or permissive (giving powers which can be used at discretion). Even the mandatory legislation is written in general terms so that there is scope for interpretation tailored to local needs. The result is a wide variation in the quality and quantity of services provided by different authorities throughout the country.

For many local authority services, central government can exercise some degree of control and this operates in three main ways:

- (a) *Finance*. Local authorities raise money from rates (property

tax) to finance their annual expenditure, but this accounts for only about one-third of their requirements. The rest comes from central government through a system known as the rate support grant. It is calculated using a complex formula which takes into account various factors, including population characteristics (proportion of children and old people and number receiving services). Central government thus has the potential to reduce the grant if a local authority acts in defiance of some important policy matter.

- (b) *Supervisory.* Central government uses inspectors to monitor certain services, e.g. education. There are advisers to local authorities for other services such as social services: the DHSS has regional social work service branches which work closely with individual local authority social services departments.
- (c) *The issue of memoranda and circulars.* Central government uses this method to advise, persuade, or exhort local authorities to adopt policies and this work is supervised by the advisers and inspectors mentioned above.

### **Organization of social services departments**

The Local Authority Social Services Act 1970 required local authorities to establish social services departments. Much of this legislative basis arose from the Report of the Committee on Local Authority and Allied Personal Social Services, chaired by Sir Frederic (later Lord) Seebohm, which presented its recommendations in 1968. This report made wide-ranging proposals, suggesting that social services should be family-orientated and community-based and that more needed to be done for the under fives, the elderly, the physically and mentally handicapped and the 'neglected flotsam and jetsam of society'. People, it considered, should be treated as people rather than as separate groups based on age and type, and the service in general should be better organized. Thus, the 1970 Act incorporated the recommendations in the Report to integrate the many social work functions and establish social services departments. Welfare and children's departments, parts of the health departments of local governments as well as social workers in hospitals came under a unified administrative structure. Social workers in education and housing departments were not included, nor were probation officers.

The services provided by social services departments to individual groups in society who are potentially disadvantaged: the physically and mentally handicapped, the elderly, the under-fives, and deprived children – are described in detail elsewhere, but an overview of the structure and function of a social services department is given here. It should be remembered that there is variation amongst individual local



**Table 4.10 Range of services in social service departments***Social work service to:*

- Children – in families
- at risk of child abuse
  - pre-delinquent
  - delinquent, including supervisory orders (from the Courts)
  - needing reception into care (e.g. during mother's hospital admission)
  - in care in community homes
  - fostering and adoption

## Individuals and families

The elderly at home

The mentally ill and their families

The mentally handicapped and their families

The physically handicapped and their families

*Social work service in:*

District General Hospitals

Hospitals for the mentally ill

Mental handicap hospitals

Geriatric hospitals

Schools

Health centres

Courts

*Residential provision:*

Homes for the elderly

Homes for mentally handicapped

Homes for mentally ill

Homes for physically handicapped

Community homes (formerly children's homes and approved schools)

Observation and assessment centres (children)

*Day provision:*

Adult training centres

Day centres for the elderly

Day centres for the physically handicapped

Day centres for the mentally ill

Day nurseries

*Other services:*

Home helps

Domiciliary occupational therapy

Meals on wheels and luncheon clubs

*Registration and/or supervision*

Private voluntary homes

Private children's homes

Child minders, playgroups and day nurseries

*Table continued overleaf*

**Table 4.10** Continued

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Handicapped persons

Blind persons

Disabled drivers

*Aids and adaptations:*

- to houses
  - provision of telephones
  - other aids
- 

authorities in the way in which these services have been organized. Table 4.10 lists the range of work of social service departments.

The Director of Social Services is the Chief Officer of the department. The post is held by a person with managerial experience and also (almost always), with social work qualifications. There may also be a Deputy Director of the department. Departments are then split into functional divisions, each headed by an Assistant Director of Social Services. There is considerable variation in the way in which these divisions are defined and financed in different localities. However, typical divisions might be given separate responsibility for residential and day care, domiciliary support services (e.g. home help service, meals on wheels), administration and training, finance and research.

The day-to-day provision of care to people in the community is carried out on a geographical basis through 'local teams' of social workers who are the main route through which all problems are first channelled. Such teams are led by a team leader and serve populations of between 50 000 and 100 000 and comprise a varying number of social workers. Usually two or three teams are combined to form an area organization and this is controlled by an area officer who has administrative support staff. Alternatively, especially in some large counties, the divisions are not structured on functional components but are based geographically on a proportion of the county. The Assistant Director (or more usually in this case, the title is Area or District Director), is responsible for the whole range of services within his division.

*Social workers' duties*

Hospital social workers usually specialize in hospital work and are organized as a group, thus providing a liaison link with social workers in the community. Teams or individual social workers may also be attached to other institutions such as schools, health centres, and courts to provide special expertise to clients in particular situations.

Whether working in the community ('field') hospital or other agency, the social worker is responsible for receiving an initial referral of a problem either directly or indirectly about a member of the public ('client'). The social worker will make an appraisal of the problem which will involve an assessment of the clients and usually also their home environment, family relationships and network of social contacts. The process of assessment may involve asking for and receiving reports on the client from other agencies (e.g. general practitioner, hospital consultant, or probation officer).

The ultimate aim of the social worker is that the client should find his or her way to the most appropriate type of services to meet, most effectively, his or her particular needs. This may mean referral to a service provided by the social services department itself (e.g. a residential home for a frail elderly person, the provision of a home help for a physically handicapped person or arranging for a day-nursery place for the child of a one parent family) or another local authority service (e.g. the housing department). It may mean bringing the problem to the attention of another agency entirely: a voluntary organization, for example, may provide a service which is particularly appropriate for the client's needs. Liaison with the health service may be more formal in the case of the hospital social worker, but in the field or community, also, health-service professionals and social workers liaise over particular patients' or clients' problems on a regular basis.

Social workers are aided in this process (of assessment of a client's or family's problems and choosing the most appropriate response) by their team leader and the area director or by specialist officers within the main social services department itself. Aside from referral to specific services, social workers may undertake to 'work the problem through' with the client and his family (individual cases, etc.) by a helping process known as 'casework'.

The role of hospital social workers is slightly different from their colleagues in the community. In addition to dealing with specific problems concerned with patients or their families which are referred to them, they will have a number of continuing responsibilities concerned with the process of hospitalization. This will vary considerably according to the type of hospital in which the social work service is being provided. In many settings, a major role will be facilitating the process of discharge. This may, for example, involve the assessment of the patient's capacity and home circumstances and arranging for such domiciliary support services as might be required. In a psychiatric or mental handicap hospital, social workers will often be part of a multidisciplinary team which reviews current in-patients in case-conference or discussion and they will have a special responsibility, in connection with the admission of patients under

sections of the Mental Health Act. In an obstetric unit the function may entail providing advice on entitlement to benefits or intended adoptions.

### *Training for social services staff*

Qualifications in social work may be obtained by taking a course (minimum 2 years) leading to the Certificate of Qualification in Social Work (CQSW). The qualifications may also be obtained by a 1-year course for someone who has a degree in social science. Some universities offer a 4-year combined degree and CQSW course.

An increasing proportion of residential care staff in children's community homes have qualified on courses for residential care. Other care staff are gradually becoming trained but at a slower rate, particularly those working in old people's homes. A new Certificate in social work (CSS) was introduced in the late 1970s and provides 2-year training for non-social worker caring staff, including family aides and other field staff; it is becoming extensively used to train residential and day-care staff. Training courses are provided for mobility officers for the blind by the Royal National Institute for the Blind, and training courses for social workers for the deaf are provided by the Royal National Institute for the Deaf. Some polytechnics and colleges of further education provide training courses for home help organizers. However, social services departments undertake a considerable amount of in-service training.

In addition, a wide range of post-qualifying courses are provided in universities and polytechnics for field and residential staff on such subjects as family therapy, mental health, social policy and research. Many of these courses are recognized by the Central Council for Education and Training in Social Work (CCETSW).

The range of tasks of social workers for clients includes:

- A means of providing access to resources.
- Therapeutic and supportive function.
- Advice and information – counselling.
- Helping clients to make decisions.
- Statutory functions (court work and compulsory admission).
- Obtaining new resources.
- Promoting the needs to other agencies for children and inarticulate adults.

### **Social security scheme**

The present social security scheme was introduced after World War II and since then has been modified and enlarged.

Initially it cost approximately £600 million per annum, which

accounted for about 15% of the total public expenditure. In 1986 the cost was £41 000 million (in real terms more than a five-fold increase) and represented nearly one third of all public expenditure. It is the single most expensive programme.

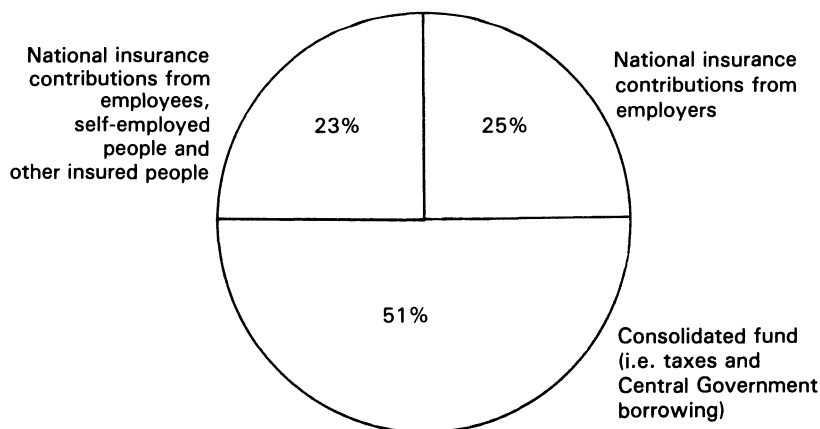
The scheme had its origin in the Report on Social Insurance and Allied Services produced by Sir William (later Lord) Beveridge and published in 1942<sup>1</sup>. This famous report reviewed the various schemes of social insurance, workmen's compensation and other services and recommended a compulsory and comprehensive insurance scheme to cover the entire population 'from the womb to the tomb' or from 'conception to resurrection'.

### *Categories of social security benefit*

There are three main categories of social security benefit:

(1) *Contributory benefits*. These depend on the payment of the required amount of contributions to the National Insurance fund. In order to qualify for contributory benefit a person has to demonstrate that, as well as meeting the conditions for receipt of benefit, he has paid enough national insurance contributions. The amount varies from one benefit to another.

(2) *Non-contributory, non-means-tested benefits*. These do not require contributions to the National Insurance fund, but depend on whether the person meets certain conditions of need and normally satisfies a residence test.



**Figure 4.8** Sources of social security finance in Britain in 1985. Source: Social Security Facts and Figures, July, 1986

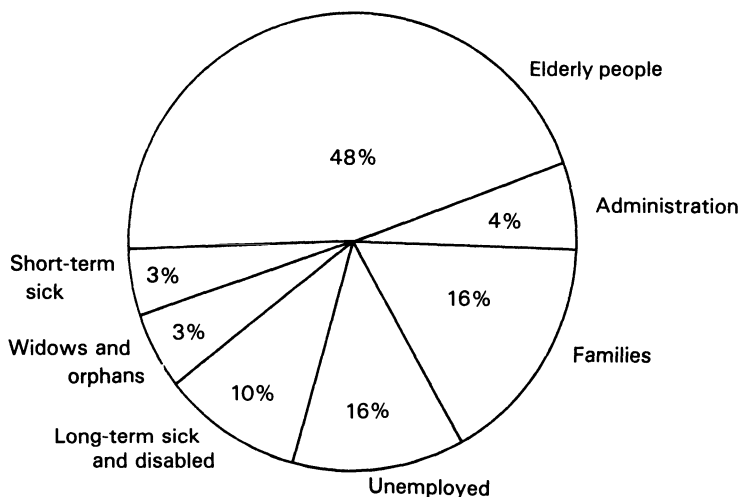
(3) *Non-contributory means-tested benefits.* These do not require any contribution conditions, but the claimant must disclose details of income and circumstances before any benefits are paid.

#### *Source of funding for benefits*

The money to pay social security benefits comes from two sources (see Figure 4.8).

- (a) *The National Insurance fund* pays for *contributory benefits*. This fund is made up of contributions from employers and employees. In addition some of the gross cost is met from central government funds (the 'Treasury Supplement'). Everyone between 16 years and pensionable age must pay National Insurance contributions if their earnings are above the annually determined minimum level. Employers pay contributions for each employee on their payroll. A very small proportion of the money collected as National Insurance contributions goes towards the cost of the NHS.
- (b) *The Consolidated fund*, which is money voted by Parliament and raised from general taxation and government borrowing, pays for *Non-contributory benefits*.

Each year 16 million claims are received, 100 million Girocheques and 53 million order books issued. There are more than 500 local and



**Figure 4.9** Estimated expenditure by groups of beneficiaries 1986 in Great Britain. Source: Derived from Social Security Facts and Figures (1986).

regional offices with about 110 000 staff backed by four large computer centres.

Approximately half the total social security expenditure goes on retirement pension. This is three times more than that spent on support for families with dependent children and nearly four times more than that spent on benefits specially intended for the sick and handicapped (which includes many elderly people) (Figure 4.9).

**Table 4.11 Proportion of total social security benefit expenditure on different contributory and non-contributory benefits, Britain 1986**

<i>Benefit</i>	<i>Percentage of total expenditure</i>
<i>Contributory benefits (paid from NI funds)</i>	
Retirement pension	40.9
Widow's benefit	2.0
Sickness and invalidity benefit	6.6
Maternity benefits*	0.5
Unemployment benefit	3.9
<i>Non-contributory benefits (paid from consolidated funds)</i>	
Industrial injuries benefits	1.1
Child benefit, one-parent benefit and family income supplement	11.4
War pensions	1.4
Attendance and invalid care allowance	1.7
Non-contributory invalidity pension	0.6
Mobility allowance	1.1
Supplementary benefit	17.6
Housing benefit	11.2
Total social security benefit expenditure (£40 900 M)	100

\*The maternity grant component is non-contributory

Source: Derived from Social Security Facts and Figures, July, 1986

### *Main benefits*

Table 4.11 shows the main contributory and non-contributory benefits as a proportion of total social security expenditure. Benefits which are mainly applicable to the handicapped, mothers and children are described in the appropriate chapters. A brief account of three benefits is given here.

*Sickness benefit* is payable to those who are incapable of work and who meet the contributions conditions. Most of the claims are for relatively short periods. The benefit is a weekly flat rate which may be increased to take account of dependants. Benefits are not paid for less than 4

consecutive days of incapacity and the first 3 days of a spell are not paid. Sickness benefit is reduced if a person is in hospital for more than 8 weeks.

*Statutory sick pay (SSP).* This is a scheme for most employees to get sick pay from their employers, with similar qualifying conditions for obtaining SSP as for sickness benefit. It is payable for up to 28 weeks and there are 3 rates of SSP depending on earnings. Employers are reimbursed for 100% of SSP payments. Employers also have a degree of discretion in accepting evidence of sickness. They may accept a self-certification form for seven days or less although medical evidence is generally required for longer periods of absence.

*Invalidity benefit.* This is a long-term sickness benefit paid at a higher rate after the person receives sickness benefit or SSP for 28 weeks. The benefit ceases when a person reaches retirement age. Like sickness benefit it is reduced if the patient is in hospital for more than 8 weeks and is further reduced if the patient has no dependants and is in hospital for 12 months. There are about 11 million new claims for sickness and invalidity benefit each year. There are about half a million people receiving sickness benefit or SSP each week and approximately 870 000 people were on long-term invalidity benefit in 1986.

*Income support.* This scheme replaced supplementary benefit in April 1988 and is intended as a 'safety net' for those who either do not qualify for other benefits or whose income falls below a certain level laid down by Parliament. It is a means-tested support scheme for those who are not working full time. Entitlement to income support is based on a system of personal allowances, extra payments or premiums in recognition of age, ill health or family responsibilities.

Housing benefits are administered by local housing authorities. People on low incomes or with high rent or rates may qualify for benefits whether they are council tenants, or (for rates rebates) owner-occupiers.

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- 1 Beveridge Report (1942). *Social Insurance and Allied Services*, Command Paper 6404. (London: HMSO).
- 2 Department of Health and Social Security (1976). *Sharing Resources for Health in England. Report of the Resource Allocation Working Party.* (London: HMSO).
- 3 Hart, J. T. (1971). The inverse care law. *Lancet*, 1, 405-412.



## Physically handicapped persons

### INTRODUCTION

This chapter deals with the problems of people aged 16 years and over who are physically handicapped because of impairment of function of some system of the body. Problems of the locomotor system which may affect mobility are discussed, as well as sensory defects (loss of hearing and visual function). Handicap in childhood and handicap resulting from mental disorder are dealt with in other chapters.

The term 'physical handicap' embraces a range of conditions which vary in origin, age of onset and prognosis. Individual handicapped people differ in their needs both for services and family or community support.

Ancient cultures and societies held an ambivalent view of those who deviated from what was regarded as physically normal; pity and sympathy coexisted with revulsion and fear. Although attitudes have changed there is still a great need for sympathy and understanding on the part of society and its members.

Society can greatly help to alleviate the problems through the provision of adequate services and suitable equipment. There are well-known obstacles in the environment to handicapped people such as steps, doorways too narrow for wheelchairs and lack of suitable toilet accommodation. Many environmental improvements, if introduced at the planning stage, would cost little more. In addition, the design of equipment such as wheelchairs could be improved to allow them to mount pavement kerbs.

In Britain from the late 1960s there was an increasing awareness of the needs of handicapped people. Since then there has been a strengthening and considerable improvement in services provided by central and local government, as well as support from voluntary agencies. In March 1974 the appointment of a Government minister with special responsibility for handicapped people set the seal of recognition on the needs of this sub-group in the population.

## THE MEANING OF HANDICAP

Disagreement over terminology used in connection with handicap goes beyond a semantic argument and may become a real barrier to progress. Terms are used by professionals in different senses to suit their own purposes when dealing with the handicapped. Thus doctors may use a word like 'disablement' mainly in the context of clinical outcome, social workers in terms of functional performance, and lawyers in relation to assessment for compensation purposes. Even within disciplines, the same term may convey different meanings in different situations. They could of course, like Humpty Dumpty, continue to use their own definition of terms. "When I use a word" said Humpty Dumpty, "it means just what I choose it to mean – neither more nor less." However, this would lead to an impossible situation and would hinder communication and prevent the better understanding of the whole problem of the handicapped. In particular, agreed definitions of the terms used are essential to determine the size of the population of handicapped people. Hence great effort has been made in the last few years to achieve uniformity of terminology, but the position is still by no means satisfactory.

Nomenclature in connection with handicapped people has been the subject of considerable discussion. In 1980 the World Health Organization produced a manual of classification of impairments, disabilities and handicaps for international use<sup>1</sup>. In it, the following three key words were defined:

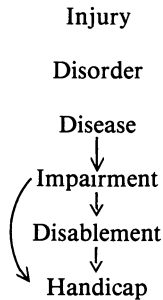
**Impairment:** "In the context of health experience an impairment is any loss or abnormality of psychological, physiological or anatomical structure or function."

Thus the state of impairment represents a deviation from normal bodily function or status, irrespective of whether it arose from injury, disease or congenital malformation.

**Disability:** "In the context of health experience a disability is any restriction or lack (resulting from an impairment) of ability to perform an activity in a manner or within the range considered normal for a human being."

Disabilities represent a limitation in tasks or activities, either physical, social or psychological, arising from the impairment.

**Handicap:** "In the context of health experience, a handicap is a disadvantage for a given individual, resulting from an impairment or a disability that limits or prevents his fulfilment of a role that is normal (depending on age, sex, social and cultural factors) for that individual."



**Figure 5.1** Meaning of handicap. Source: World Health Organization (1980). *International Classification of Impairments, Disabilities and Handicaps: A Manual of Classification Relating to the Consequences of Disease*. (Geneva: WHO)

Thus handicap is very dependent on the structure and attitudes of the society in which the individual exists: handicap is a relative concept.

The concept of disadvantage introduced by the definition is usually only present for part of the time, unlike disability which implies a loss of function which is obviously present *all* the time. These concepts are shown in Figure 5.1 and their relationships are complex. Some clarification of these concepts is provided by the examples shown in Table 5.1.

Standardization of classification of impairment, disability and handicap is still in its early phase and has not yet come into general usage. Thus in legislation, official reports and in papers by policy-makers and service planners the terms 'disabled' and 'handicapped' are used interchangeably to describe the client group. Inevitably, therefore, this also occurs throughout this chapter.

## EXTENT OF THE PROBLEM

Since the end of World War II, a number of studies have been carried out involving handicapped people in Great Britain. There is agreement that handicapping conditions are age-related, with a much higher prevalence amongst the elderly.

### The Harris Study

The most influential study is the National Survey of Impaired and Handicapped People in Great Britain (1971) carried out for the Office of Population Censuses and Surveys by Amelia Harris and her

**Table 5.1** Examples to illustrate the concepts of impairment, disability and handicap

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A child born with a finger-nail missing has a malformation – a structural impairment – but this does not in any way interfere with the function of the hand and so there is no disability: the impairment is not particularly evident, and so disadvantage or handicap would be unlikely

A myope or diabetic individual suffers a functional impairment but, because this can be corrected or abolished by aids, appliances, or drugs, he would not necessarily be disabled; however, the non-disabled juvenile diabetic could still be handicapped if the disadvantage is considerable, e.g. by not being allowed to partake of confectionery with his peers or by having to give himself regular injections

An individual with red-green colour blindness has an impairment, but it would be unlikely to lead to activity restriction; whether the impairment constitutes a handicap would depend on circumstances – if his occupation were agricultural he might well be unaware of his impairment, but he would be at a disadvantage if he aspired to drive a railway engine, because he would be prevented from following this occupation

Subnormality of intelligence is an impairment, but it may not lead to appreciable activity restriction; factors other than the impairment may determine the handicap because the disadvantage may be minimal if the individual lives in a remote rural community, whereas it could be severe in the child of university graduates living in a large city, of whom more might be expected. (This example illustrates how any attempt to differentiate between intrinsic and extrinsic components of handicap in fact neglects the fundamental property of this concept, which expresses the resultant of interaction between the intrinsic and the extrinsic; the intrinsic aspect is identified by any impairments and disabilities that may be present.)

Perhaps the most graphic example of someone who is handicapped without being disabled is the individual who has recovered from an acute psychotic episode but who bears the stigma of being a 'mental patient'; note that this handicap complies with the definition, because it is consequent upon impairment and disability, but that neither the impairment nor the disability exists at the time the handicap develops

Finally the same handicap can arise in different situations, and therefore as a result of different disabilities. Thus, personal hygiene might be difficult to maintain, but its antecedents could be very different for someone accustomed to a washbasin as compared with a way of life where ablutions are performed in a lake, or in a fast-moving river, or yet again in a desert environment

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Source: World Health Organization (1980). *International Classification of Impairments, Disabilities and Handicaps: A Manual of Classification Relating to the Consequences of Disease*. (Geneva: WHO)

colleagues<sup>2</sup>. Although discussing the results of this survey raises a different set of definitional criteria, the results are sufficiently important in examining the size of the problem of physical handicap in Britain to warrant inclusion here. The survey was limited to those aged 16 and over, living at home in Britain. Handicapped people in institutions and handicapped children were excluded. In addition, the survey concentrated on the capacity of individuals for self-care, hence, although locomotive impairment was included, those, for example, with sensory impairment were included only if their ability to care for themselves was limited. Thus no attempt was made to enumerate those suffering from blindness, deafness, diabetes, epilepsy, and similar disorders, except where a person felt his impairment limited his getting about, working or taking care of himself.

The definitions used in the report concerning the degree of handicap are based on functional loss and restrictions of activity and are shown in Table 5.2.

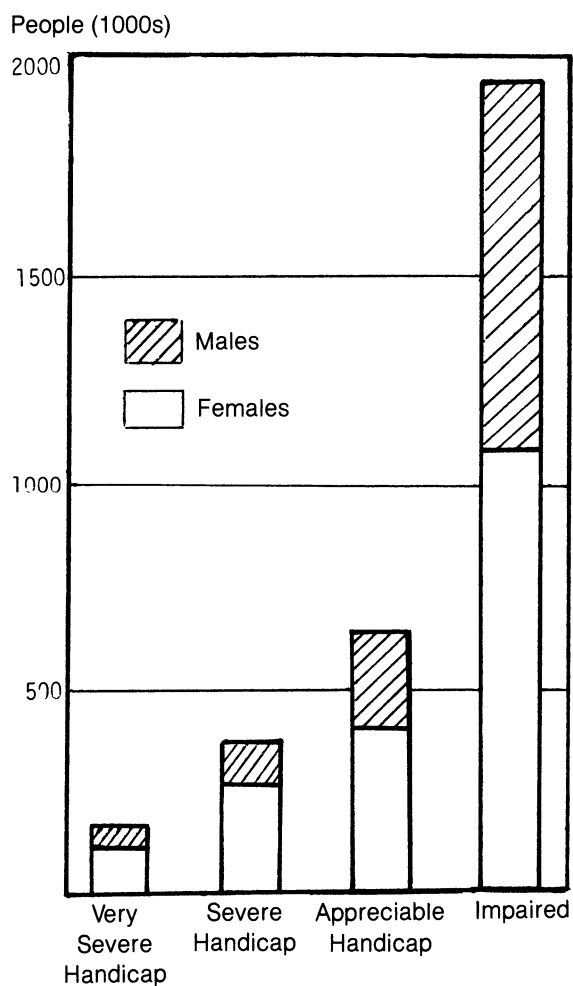
**Table 5.2 Degree of handicap**

- 
1. *Very severe*: needing permanent special care, the degree of handicap in this category may include being chairbound or bedfast, unable to feed, dress, wash or use the toilet independently
  2. *Severe*: people who have difficulty in performing most of the activities of daily living, some of which they find impossible
  3. *Appreciable*: people who can perform a fair amount of activities of daily living, but have difficulties with some items and may have to have some help
  4. *Impairment*: people who generally have no difficulty with self-care and have only minor problems
- 

Source: Harris, A. I., Cox, E. and Smith, R. W. (1971). *Handicapped and Impaired in Great Britain, Part I*. London: HMSO

The Harris study estimated that over 3 million people (7.8% of the adult population) aged 16 or over, living in private households, had some physical, mental or sensory impairment, of whom about 1½ million (6.7%) were men and just over 1¼ million (8.2%) were women. Many more elderly people were impaired compared with those in the younger age groups; about half the men who had some impairment were aged 65 and over, as were two-thirds of the women.

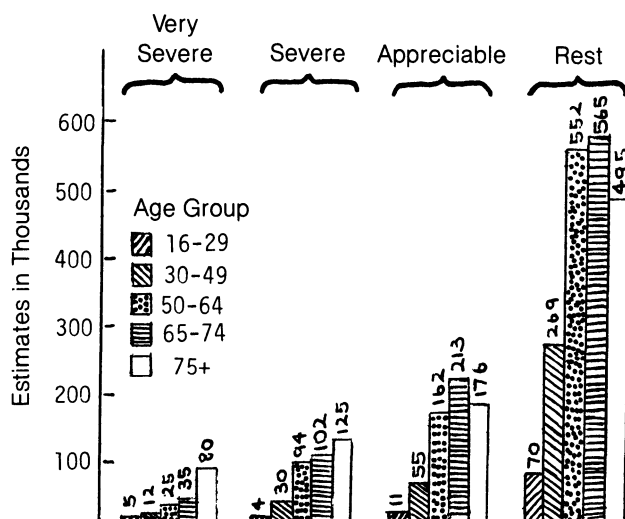
Impairment did not always result in a person being handicapped; indeed the greater proportion of impaired men were able to carry out usual everyday activities without any or only minor difficulty. The survey estimated that 157 000 very severely handicapped people needed



**Figure 5.2** Handicapped and impaired adults in the community. Source: Office of Health Economics (1977). *Physical Impairment: Social Handicap*. (OHE: London). Derived from Harris Survey data<sup>2</sup>.

special care. Approximately 25 000 of these (mainly elderly women living in private households) required such care for 24 hours of the day. The remaining 133 000 could cope if they had constant day-care.

Handicap of this severe degree was much more common in women than men; in round figures 113 000 women (3.7% of adults) compared with 45 000 (2%) of men. There were 357 000 severely handicapped people who needed a considerable amount of support; 616 000 who were appreciably handicapped and although they could do a fair amount for themselves, needed some support. The remainder, almost 2 million, who were impaired needed little or no support for their normal everyday activities. In each of these groups of degrees of handicap there was a preponderance of women (Figure 5.2).



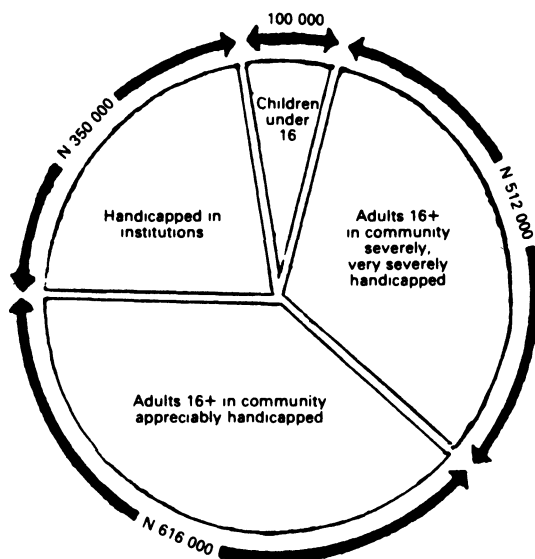
**Figure 5.3** Estimated numbers of people in Great Britain with different degrees of handicap by age. Source: Lees, D. and Shaw, S. (1974). *Impairment, Disability and Handicap - A Multidisciplinary View*. (London: Heinemann Educational Books for the Social Science Research Council).

Derived from Harris survey data. <sup>2</sup>

The increase of handicap with advancing age, particularly for the very severe and severe degrees, is shown in Figure 5.3.

There were regional variations with Wales, Yorkshire and Humberside having the highest proportion of impaired men and London and the South-East the lowest. The highest proportion of impaired women was found in the South-West.

Thus there are just over 1 million handicapped people at home and



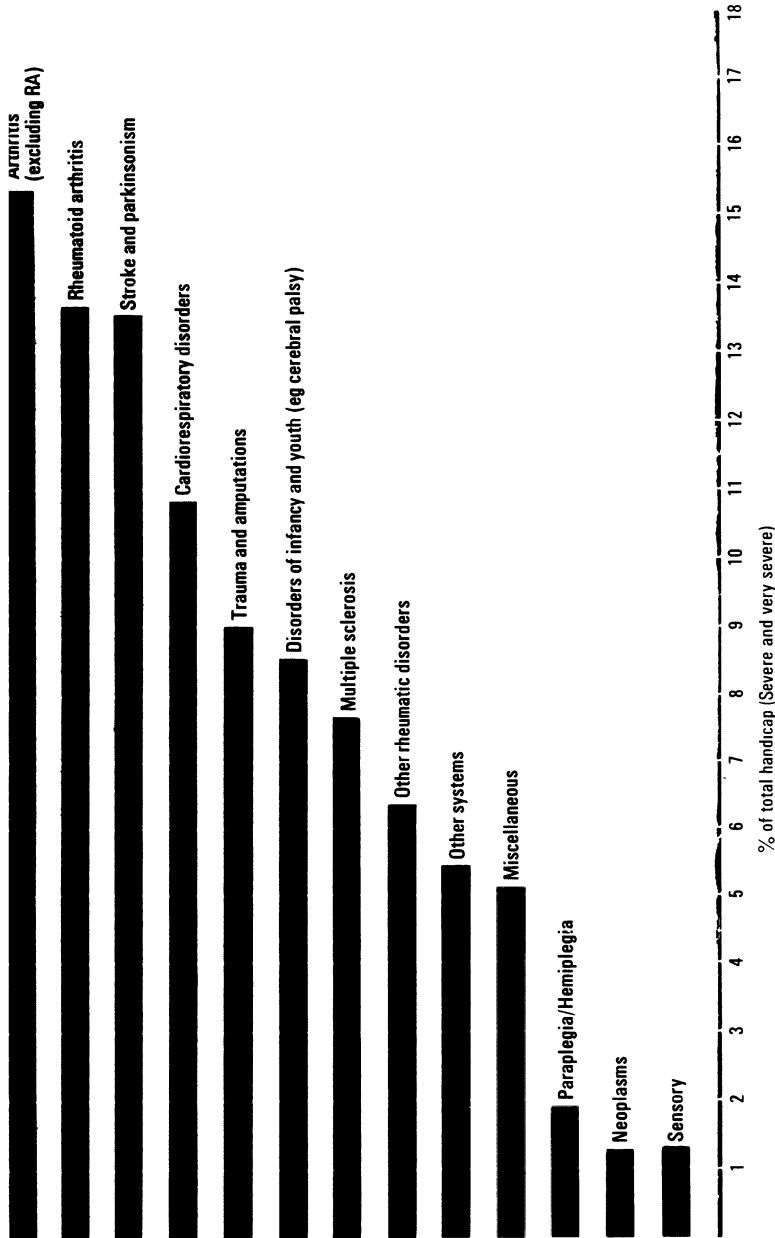
**Figure 5.4** Number of physically handicapped people in Britain. Source: Office of Health Economics (1977). *Physical Impairment: Social Handicap*. (London: OHE). Estimate based on data from various sources.

various surveys have shown that it can be estimated that approximately 350 000 severely handicapped people are in institutions and there are 100 000 children under 16 (see Figure 5.4).

### Official statistics

Aside from this special survey and other studies, there are official sources of information about the number of handicapped people. The Department of Employment holds a register of Disabled Persons, under the Disabled Persons Employment Act, 1944. Local authorities maintain registers for substantially and permanently handicapped persons (including those with visual and hearing impairments) under the National Assistance Act 1948. Statistics are published regularly of the numbers eligible for various cash allowances under the social security scheme. The General Household Survey (see Chapter 1) also collects data on the presence of longstanding illness, disability or infirmity, although these data are self-reported and self-defined. Statistics from these sources all underestimate to a varying extent numbers of handicapped persons in Britain; they are further discussed later.





**Figure 5.5** Main causes of severe and very severe handicap in adults of working age (16-65 years). Source: Office of Health Economics: derived from Wood, P. H. N. (1976). Paper read at Society for Social Medicine; Symposium on Use of Patient Classification for Research and Management of Long-term Care.

## **ORIGINS OF HANDICAP**

Of the total population in the Harris Survey, approximately 10% were under the age of 45. About a third were aged 45–64, and almost 60% aged 65 and over. This gives a clue to the underlying causes of impairment. These are modern epidemic diseases of later life, such as arthritis, stroke, coronary artery disease and bronchitis. Most cases of physical handicap occurring in infancy are due to congenital malformations and birth injuries such as spina bifida, hydrocephalus, and cerebral palsy. Accidents at home, on the roads and at work account for impairment arising in childhood and youth. Following many years of freedom from major conflict there are very few young people in Britain handicapped as a result of war. It is difficult to get accurate figures concerning the numbers of people severely handicapped following road traffic accidents, but it is probable that something over a thousand such cases occur each year. The majority of road accident cases appear to recover sufficiently to be able to look after themselves.

Figure 5.5 illustrates the frequency of severe and very severe handicap in adults of working age. Surveys in other industrialized countries also show that the majority of handicapped persons are elderly. Most of these physical handicaps first become manifest between the ages of 45 and 64 years.

## **EMPLOYMENT**

Work, though a means of financing household necessities and leisure pursuits, also provides status and self-esteem for the individual and is the basis of many of his social contacts. Indeed, for some it represents the main focus of their lives. The work orientation of many modern societies is a source of additional pressure for disabled people. Even those who are very severely disabled may perceive work as a means of drawing closer to normal members of society,

### **Legal basis**

For many years it has been considered necessary to provide a legal framework to allow disabled people of working age to obtain and keep employment. The present provisions are laid down in the Disabled Persons Employment Acts 1944 and 1958.

The 1944 Act defines a disabled person as “one who, on account of injury or disease (including a physical or mental condition arising from imperfect development of any organ) or congenital deformity, is substantially handicapped in obtaining or keeping employment, or undertaking work on his own account of a kind which apart from

injury, disease or deformity would be suited to his age, experience and qualifications”.

The Act provides for the setting up of a register of disabled persons. The Secretary of State for Employment may designate certain categories of work as being reserved for registered disabled people. It is an offence for an employer to engage an unregistered person for these kinds of work without permission. The Act also makes provision for training and rehabilitation courses.

The 1958 Act empowers local authorities to provide sheltered employment for disabled people. The Act also allows a disabled person who objects to his name appearing on a register to have it removed (no provision had been made for this in the earlier Act).

### **Organization**

Most of the policies and responsibilities for employment, including those for disabled people, are controlled centrally. The government department concerned is the Department of Employment, but the Manpower Services Commission, an independent body accountable to the Secretary of State for Employment, is responsible for public employment and training. Two divisions of the Manpower Services Commission have special relevance to disabled people:

- (a) The Training Service Division (TSD) responsible for making arrangements for training in a wide diversity of subjects, makes special provision for the disabled.
- (b) The Employment Services Division (ESD), responsible for employment and job centres, includes special help for the disabled through its resettlement and rehabilitation service.

### **Disablement Resettlement Service**

The main source of help and advice for the disabled person on his employment prospects and training is the resettlement service of the ESD. Disablement Resettlement Officers (DROs) and the more specialized Blind Disablement Resettlement Officers (BDROs) are based locally at job and employment centres. A few are also based at hospitals. These officers have close contacts with employers and can call on professional opinion and advice so that they are in a position to match the job to the aptitude and capacity of the individual.

### **Disabled Persons Register**

The register of disabled persons (required under the Disabled Persons Employment Act 1944) is compiled and maintained through the DROs. It is for the individual disabled person to decide whether to register or not, and many do not do so. To qualify for registration a person must

be handicapped to a degree which hinders him in obtaining and keeping employment. Moreover, he must want a job and have a reasonable prospect of obtaining one in the light of his handicap. The disability must have an anticipated duration of at least 12 months.

The main advantage to the disabled person of registration is that it helps him to obtain a job through the quota system and it is a requirement in order to obtain sheltered employment. It is not, however, necessary to be registered as disabled in order to have access to the rehabilitation and resettlement services.

Most disabled adults acquire their disability through injury or disease after they are already well established in the work force, and it is thought that many may keep their jobs and adjust to their change in personal circumstances. However, the register continues to be unpopular with disabled working people and this was so even during periods of higher unemployment in the late 1970s. It seems clear that there was no perceived advantage to being registered and indeed it may have been considered as a disadvantage in terms of job opportunity. There were 650 000 registered disabled people in 1967 and by 1980 this figure had declined to 470 000, an estimated one-third of the total number of disabled people in employment. These numbers are considerably short of those needed to fill the 3% employers' quota.

In the light of these and other circumstances, there are currently proposals being made to abandon the quota system. As long ago as the early 1970s, a review of the services had recommended that the quota system, the register and the special designation of occupations should be terminated.

### **Types of employment available to registered disabled people**

#### *Employment in open industry under the quota arrangements*

The quota is currently 3% of all employees, and the regulations apply to all firms employing more than 20 people. Although it is not an offence to be below the quota, an employer in this situation must not engage a non-disabled person to fill a quota place without a permit from the DRO.

#### *Employment in designated jobs*

Two occupations are reserved specifically for registered disabled persons: car park attendants and passenger electric lift attendants. For these jobs an employer must obtain permission from the DRO to employ a non-disabled person.

#### *Sheltered employment*

For those disabled people who are so handicapped that they are unable

to work in open employment, a number of opportunities are available for sheltered employment.

Remploy is the best known in this field and is a limited company established by the government in 1946 to provide meaningful work for severely disabled people who are unable to obtain it in open industry. The company has 89 factories in Great Britain producing a wide range of products including textiles, furniture and leather goods. It employs about 8200 severely disabled people.

Some sheltered workshops are also provided by local authorities and voluntary organizations. Examples of the latter are the Royal British Legion and the Spastic Society. There are about 150 such workshops in Britain employing 5000 severely disabled people.

### **Special schemes to assist in employment of disabled people**

The following schemes are organized by the MSC.

#### *Job introduction scheme*

This is intended to encourage employers to give a trial period of employment (usually six weeks) to disabled people to assess their suitability for a job. During this time a contribution is made towards their wages.

#### *Special aids to employment*

Special tools or equipment are available on permanent loan (and free of charge) to assist a disabled person which an able-bodied person would not need doing the same work. Most of the aids in use at present are lent to people who are blind or partially sighted.

#### *Adaptations to premises and equipment*

Grants may be given to employers for adaptation of premises and equipment to enable them to recruit disabled workers more easily.

#### *Assistance with fares to work*

This scheme recognized the additional expense of getting to and from work for disabled people who cannot use public transport. People must be on the disabled persons' register to qualify for this assistance.

Despite these positive discriminatory measures the unemployment rate amongst registered disabled people in Britain was 14.6% in December 1980 compared with a figure of 9.1% for the population as a whole.

**TRAINING**

As mentioned earlier, the Manpower Services Commission has schemes to help to train those who are disabled. Other agencies are also involved in this process. The main training facilities available for the disabled are summarized below.

**Training Opportunity Scheme (TOPS)**

The TSD offers courses under TOPS which include special training facilities for those registered as severely disabled. About 80% of the disabled are trained alongside able-bodied people. Although TOPS has less strict eligibility rules for the disabled, it is not primarily designed for them, hence not all courses are suitable.

**Employment Rehabilitation Centres**

The ESD has 27 of these centres located in various parts of the country in or near centres of population. Courses are arranged for individuals and so vary in length as well as content, although their usual duration is six to eight weeks. Specialist advice can be obtained from occupational psychologists, social workers, occupational therapists and physicians. The centres are equipped with modern factory and office facilities. Free meals are provided and travelling and subsistence allowances are available.

**Residential training**

For those disabled people who need training under residential conditions, four colleges were provided by the late 1970s by voluntary organizations and supported by the TSD. They are located at Durham, Exeter, Leatherhead and Mansfield and have about 600 places. Disabled people from any part of the country can attend courses and admission is arranged through the local DRO. They are not intended, however, for blind people, for whom there are separate facilities.

**Training for younger disabled people**

Local education authorities provide a career service which works in partnership with the Manpower Services Commission. The service is especially designed for young people who are attending full- or part-time educational institutions (except universities) or have just left them. It provides vocational guidance as well as help in obtaining employment. Many education authorities appoint special careers officers to work with handicapped secondary-school children and to counsel them and their parents about employment. Confidential medical reports are obtained from the schools' medical officers and from the Employment Medical Advisory Service of the Health and Safety Executive. Careers officers also work closely with other agencies

concerned with handicapped young people, such as social workers and voluntary organizations.

**Ad hoc schemes**

Training on an individual basis can also be provided by an employer, supported financially by the TSD. Similarly, professional careers may be supported. The special facilities which exist to train blind and deaf people are dealt with in later sections.

**BENEFITS AND ALLOWANCES**

Although evidence is insufficient, there are indications from available data that most disabled people at work have a lower earning capacity and are over-represented in the lower socio-economic groups.

A network of financial benefits to support disabled people has been devised, though it has been criticized because of its piecemeal nature and because of inconsistencies between different schemes. Financial support for disabled people falls broadly into five schemes.

**Service pensions and allowances**

It has long been a principle that those in the armed forces should be adequately compensated for injury or disablement sustained in the course of their duties. In the case of war pensions the amount payable depends on the degree of impairment and this is assessed medically. The rate is also related to the rank of the recipient and thus is earnings-related. This pension continues after retirement age, is paid in addition to the old-age pension, and is unaffected by other sources of income. There are also allowances for dependents. The amount of pension paid is reduced only if there is an improvement in the disabling condition.

**Industrial compensation scheme**

A variety of benefits is paid to workers who are injured or contract disease as a result of employment. Compensation is paid only for certain scheduled diseases. New diseases and conditions are added to the list from time to time as additional information becomes available. The scheme has similarities with the armed forces pension scheme, but there are important differences: in general the rates are lower (approximately that of a private in the armed forces), and the pension payable is a flat rate which is not earnings-related.

**National insurance benefits**

There are two main benefits in the contributory scheme to support disabled civilians who do not qualify for the industrial scheme. They are: (a) sickness benefit; and (b) invalidity benefit. These benefits, of

course, also apply to groups other than the disabled and are described in Chapter 4.

### **Non-contributory benefits**

There are four benefits mainly for handicapped people for which no contributory conditions apply and which are not means-tested. However, one of these is taxable (Invalid care allowance).

#### **(1) Severe Disablement Allowance (SDA)**

SDA is a benefit for people aged 16 and over who are unable to work because of long-term sickness or disability, and who do not normally get sickness benefit because they have not paid sufficient national insurance contributions. It is tax-free, and is not means-tested. People who first became incapable of work for at least 28 weeks on or before their 20th birthday only need have their disablement assessed if they have worked for more than 26 weeks since that period of incapacity.

People who become incapable of work after their 20th birthday must be assessed as at least 80% disabled for a minimum of 28 consecutive weeks. Under certain circumstances, people will be regarded as 80% disabled if they:

- Receive attendance allowance

- Receive mobility allowance

- Receive war pensioners mobility supplement

- Have received a vaccine damage payment

- Have an invalid tricycle or invalid car, or private car allowance from the DHSS

- Are registered with a local authority as blind or partially sighted (except in Scotland)

- Have already been found to be 80% disabled for industrial injuries disablement benefit, or for war disablement pension.

If none of the above conditions apply the DHSS may arrange for a medical assessment, using a scheme similar to that used for war and industrial injuries. Each disability is given a percentage, and the percentages added together to give a total assessment. Assessments between 75% and 79% count as 80% disabled.

Using this scheme for assessment of disablement does not mean that the person has to be housebound or requiring continuous attention. For example, someone who is profoundly deaf or totally blind will be assessed as 100% disabled. Similarly, so will someone who has lost both arms or legs, however well they may manage with artificial limbs. However, some kinds of disablement vary too much to be covered by hard and fast rules, and there are no set percentages for conditions such as mental handicap or mental illness.



*(2) Attendance allowance*

This allowance is payable to adults and children over the age of two years who are severely physically or mentally disabled. The person qualifying for such an allowance must be so severely disabled that he requires attention throughout the day or night or both. A higher rate is payable if such attention (attendance) is necessary both during the day and at night. It was introduced in 1971 to help people who were severely disabled and being cared for in their own homes. Independent boards in the UK decide whether the medical requirements for the receipt of attendance allowance are satisfied. The allowance ceases after the first four weeks in institutional care (e.g. hospitals, children's or old people's homes). The allowance is not affected by receipt of other social security benefits. Nearly 641 000 people in 1987 were receiving attendance allowance, in just less than half the cases, at the higher rate.

*(3) Invalid care allowance*

The intention of this benefit is to provide income for men and women who are unable to get to work because they are caring for a relative who is receiving attendance allowance. Originally this scheme was limited to men and single women but it was later extended to include married women. The recipient of the allowance must care for the severely disabled person for at least 35 hours a week. About 80 000 men and women in England and Wales received this allowance in 1986, including 70 000 married women.

*(4) Mobility allowance*

About 450 000 people in England and Wales in 1987 received mobility allowance. The aim of this benefit is to allow handicapped people to get out and about. To qualify, the disabled person must be unable (or virtually unable) to walk because of physical handicap and the condition must be expected to persist for at least 12 months. It must also be demonstrated that the person is capable of appreciating and benefiting from such a change of surroundings. Eligibility is based on medical evidence. It is not necessary to be a car driver to obtain mobility allowance; other forms of transport, such as taxi, can be used. In addition, recipients are exempt from paying road tax on their vehicles. Initial applicants for the allowance must be in the age group 5-65 years and for those already receiving it payment ceases at 75 years of age. Disabled people in hospitals or residential homes are eligible, provided that they are judged to be able to benefit from it. Payment of the allowance is not affected by receipt of other social security payments or supplementary benefits.

Motability is a voluntary organization in the UK set up at the

initiative of central government. It is a registered charity which enables people with mobility allowance to use it to acquire cars and electric wheelchairs. Motability's schemes are based on money made available by banks at favourable rates of interest. From 1978 to 1981 they had issued over 12 000 new cars on lease or hire-purchase and have a scheme for hire-purchase of good used cars.

### **Income support**

Like other deprived groups, disabled people are entitled to income support. There are four premiums which may be payable to disabled people.

## **SERVICES**

### **Evolution of services**

In Britain, the self-sufficient village communities before the Industrial Revolution apparently bore the responsibility of care for their crippled and handicapped members. However, life in the grim industrial towns was a different story, with the maimed, the halt and the blind populating the streets as beggars or languishing in the austere and forbidding workhouses.

The softening of attitudes and with it, the first glimmer of a more caring society, emerged at the end of the eighteenth century when schools for blind and deaf children were first established, although not until the end of the nineteenth century were School Boards required to ensure that all blind and deaf children in their jurisdiction received suitable elementary education. Earlier in the present century, educational authorities were given additional powers to provide special education for epileptic and mentally handicapped children and this was made obligatory in 1914. During the latter half of the nineteenth century, a number of voluntary societies were founded which were concerned with the welfare of particular groups of handicapped people such as the blind, the deaf and the crippled. The Workman's Compensation Act, 1897 and the National Insurance Act, 1911 began to make some material provision for the sick and people injured in industrial accidents.

In the second decade of this century, the importance of after-care for tuberculosis was demonstrated. The first village settlement was established – the Bourne Colony, later transferred to the village of Papworth in Cambridgeshire. At a time when people with tuberculosis

were barred from most normal occupations, this settlement provided a special environment in which tuberculosis patients could work and live normally with their families under medical supervision.

During World War I, rehabilitation regimes including physiotherapy, hydrotherapy, remedial exercises and occupational therapy were organized for orthopaedic cases. Meanwhile, the work of St Dunstan's Hospital for blinded soldiers and sailors showed how experts with a medical approach could train disabled people to acquire self-reliance and compensatory skills.

Unfortunately, rehabilitation fell into disfavour after World War I because it was thought that the strict regimes worked out in military hospitals would be impracticable with civilians. However, interest was rekindled in the mid-thirties and by the beginning of the Second World War, some hospitals were providing rehabilitation for orthopaedic patients, while similar centres outside hospitals had been established by a few pioneer organizations.

Meanwhile, some progress had been achieved in meeting the financial and social needs of handicapped people. Voluntary organizations increased in number and introduced more innovations, whilst at Government level a variety of schemes were established.

The King's National Roll Scheme, for example, began in 1919 by giving employers who accepted an agreed percentage of handicapped workers a preference in allocating Government contracts.

Another scheme gave grants to undertakings which employed severely disabled men. The training of disabled ex-servicemen in government instructional factories helped them obtain employment in open industry. Moreover, a series of measures starting with the Blind Persons Act, 1920 took blind people out of the ambit of the Poor Law and made local authorities responsible for their maintenance and welfare.

The large number of military and civilian casualties sustained during World War II brought about rapid innovations in rehabilitation methods and in special schemes for handicapped people. Under the Emergency Medical Service, a large number of hospitals were taken over by the Ministry of Health to take care of war casualties and evacuated civilian patients. Thus the improved resources as well as a moral obligation towards war casualties stimulated a progressive attitude. The range of occupations for which disabled men were trained greatly widened to include skilled engineering work, whilst rehabilitation methods similar in principle to those used in orthopaedic practice were applied to all categories of sick and injured people. Furthermore, an increasing emphasis was placed on the involvement of patients in their own treatment through the extended use of group exercise and remedial games.

The measures introduced towards the end and immediately after World War II, laid the foundation for the way in which the welfare of handicapped people is provided today.

### **Health services**

Handicapped people make large demands on the health services: about 90% of those in the Harris survey<sup>2</sup> consulted their general practitioner at least once every two months; 12.5% consulted him weekly; over 70% used drugs because of their impairment; and 10% were receiving hospital out-patient treatment.

One of the main services provided by the NHS for disabled people is rehabilitation after injury or illness. This service, originally established to help war casualties, is still in many places inadequately orientated towards the chronic diseases which are the main causes of serious handicap today. In 1972, a report by a government advisory committee<sup>3</sup> recommended the setting up of a hospital-based rehabilitation service and the creation of consultant posts in the subject. These recommendations were not implemented, although a few demonstration rehabilitation centres were established and chairs in rehabilitation medicine were founded at the Universities of Edinburgh and Southampton. Opinion now seems to have swung away from this rather specialized medical approach towards a more multi-disciplinary, community-based service with involvement of other professionals such as occupational therapists, physiotherapists, remedial therapists and chiroprodists.

Nevertheless, there is still a need for considerable medical input. The person injured in a road accident or suffering from a stroke requires rehabilitation after initial treatment, so that he can get back to work or resume normal activities as far as possible. Similarly, someone with a chronic condition such as arthritis will need long-term medical supervision. Like many other services, rehabilitation requires co-ordinated team work with the main objective being to maximize recovery and reduce secondary effects.

### **Social services**

Local authority social services committees are empowered to provide a wide range of services for handicapped people by statute law. Two Acts embody most of these functions.

*National Assistance Act 1948.* This Act was one of the main pillars of the welfare state established at the end of World War II. It was a wide-ranging legislative measure dealing with various people in need, including the disabled. Amongst its measures it included powers for local authorities to provide for the welfare of "persons who are blind,

deaf or dumb and other persons who are substantially and permanently handicapped by illness, injury or congenital deformity or such other disabilities as may be prescribed by the Minister”.

Under the Act, the arrangements which local authorities may make include:

- (a) advice on available services to those concerned;
- (b) instruction in ways of overcoming the effects of disability;
- (c) provision of workshops and hostels for handicapped workers;
- (d) provision of work for handicapped persons;
- (e) assistance in the disposal of the produce of such work;
- (f) the provision of recreational facilities;
- (g) compilation and maintenance of a register of handicapped persons.

Although most of the powers in the Act were discretionary, it was made a *duty* to provide welfare services for blind people, as had been the case in previous statutes. The Act also gave local authorities powers to contribute to the funds of voluntary organizations and use them as their agents to provide certain services.

*Chronically Sick and Disabled Persons Act 1970.* This Act was a further major extension and improvement of services for disabled people. It was introduced as a Private Member’s Bill and was intended to make it compulsory for local authorities to provide welfare services for disabled people. It set out the legal framework for wide-ranging measures including welfare, housing, access to and facilities at premises open to the public, provision of public sanitary conveniences, public signs, access to and facilities at educational establishments, badges for display on motor vehicles and special educational treatment for the deaf, blind, autistic and dyslexic. Section I of the Act places a *duty* on every local authority (having functions under Section 29 of the National Assistance Act, 1948) to inform themselves of the numbers and needs of disabled persons to whom Section 29 applies in their area. They are also required to publish information about the services they provide and *ensure* that disabled people are informed of other services relevant to their needs.

Under Section II of this Act such authorities *must* make arrangements for any or all of the matters listed that are necessary to *meet the needs* of the disabled who are ordinarily resident in their area:

- (a) practical assistance in his home;
- (b) assistance in obtaining television, library or similar recreational facilities;

- (c) lectures, games, outings or other recreational facilities outside his home or assistance in taking advantage of educational facilities;
- (d) facilities for or assistance in travelling to and from his home for the purpose of participating in any services provided under these arrangements by the authority;
- (e) assistance in arranging for the carrying out of any works of adaptation in his home or for the provision of any additional facilities designed to secure greater safety, comfort or convenience;
- (f) facilitating the taking of holidays;
- (g) provision of meals for the disabled person, whether in the home or elsewhere;
- (h) assistance in obtaining a telephone and any special equipment necessary to enable him to use the telephone.

Other provisions include the separation of the younger long-term disabled people from the elderly in hospital and local authority residential accommodation, and the appointment of disabled people or those with experience of their needs to serve on advisory bodies and local authority committees. Permitting the use of pavements and footpaths by wheelchairs, whether motorized or not, and the issue of badges for motor vehicles is another function of the local authorities in meeting the needs of disabled people.

### *Limitation of statutory powers*

Although the 1970 Act was intended to compel local authorities to provide for disabled people so that there would be an adequate and uniform standard of services throughout the country, it soon became apparent that the Act was not being applied in this way. Section II of the Act made it a 'duty' to provide a wide range of services, in accordance with the individual's 'need', which itself was not defined. Thus, local authorities can create their own criteria for the existence of need. For example, criteria for recognizing the need for a telephone will vary from authority to authority. As a consequence services throughout the country vary widely in quality and quantity. In addition, many observers believe that disabled people are inadequately informed about the services which are available to them, although this is a duty placed on local authorities in Section I of the Act. It is quite clear that local authorities do not have adequate funds to provide all the services required by the Act. They point out that sufficient resources were not and have not been made available from central government to implement its provisions.

*Registers of handicapped people*

Local authorities maintain registers of different categories of handicapped people under the National Assistance Act 1948. One of the functions of the register is to provide a guide to the likely demand for services. There was a large increase in the total numbers registered as substantially and permanently handicapped from under a quarter-of-a-million in 1970 to almost three-quarters-of-a-million in 1977. This large increase reflects the efforts of local authorities by surveys and other means to meet the requirement of the Chronically Sick and Disabled Persons Act 1970 to "inform themselves of the numbers and needs of disabled persons" in their area.

Registration is voluntary and although some services and concessions are given to those who are registered, they can also be provided to those who are suitable for registration without their names being actually recorded on the register.

Clearly there is gross under-registration, particularly of those who are less severely handicapped. Amongst the reasons for this may be that the latter group do not perceive themselves as handicapped or do not wish to be identified as such. About 46 000 persons on the register are very severely handicapped and 231 000 severely or appreciably handicapped (Table 5.3). The position of the 200 000 people on the register with visual or hearing impairment is discussed later in the chapter.

**Table 5.3** Persons registered under the National Assistance Act 1948 by local authorities as substantially and permanently handicapped in England in 1977

<i>Handicap</i>	<i>No. of persons registered</i>	
	<i>Total</i>	<i>65 years and over</i>
Total handicapped	717 000	442 000
Very severely handicapped	46 000	24 000
Severely or appreciably handicapped	231 000	147 000
Blind	103 000	76 000
Partially sighted	45 000	31 000
Deaf	28 000	7 000
Hard of hearing	27 000	20 000
Other classified persons and unclassified	440 000	270 000

Source: Health and Social Service Statistics for England (1978) (London: HMSO)

*Non-residential services*

Despite geographical variation in the availability of services, local authorities provide the following services:

*Day centres and clubs.* Local authorities and also voluntary organizations provide day centres which handicapped people can attend. There are normally facilities for handicraft and sub-contract work and a mid-day meal is provided. In a survey published in 1981<sup>4</sup>, none of the local authority centres in the sample reported visits from physiotherapists or speech therapists. However, some day centres are beginning to look beyond providing care or work towards facilitating personal development by offering education in its broadest sense: information and social rehabilitation. This is likely to become a permanent feature, given the decline in availability of sub-contract work which has been the mainstay of many day centres.

*Meals on wheels.* This service, which is referred to in the context of the elderly (see Chapter 8) is also available to disabled people, particularly those who have difficulty in preparing their own meals at home.

*Recreation, holidays and travel.* Local authorities are empowered to provide recreational facilities for the handicapped in their area. Many sports centres make provisions for the disabled in their programme and run special sports clubs. Local authorities may also assist registered disabled people to have holidays by giving advice on locations with special amenities, making financial contributions, and making arrangements for travel. Some authorities arrange group holidays, particularly to overseas destinations.

However, the number of disabled people who have such holidays is small. Often the 'holiday' consists of admission to a residential accommodation in order to give the caring relatives a rest .

Voluntary organizations also make a variety of arrangements for holidays. Many provide guides to meet particular needs and others maintain caravans, chalets and bungalows which are made available to their members. There also exists a large number of voluntary organizations catering for sports and cultural recreational interests of the disabled, from wine-making to wheelchair dancing.

Disabled people or their drivers are entitled under the Orange Badge Parking Scheme to parking concessions without charge or time limit in certain restricted parking spaces and at parking meters. Concessions apply on the toll charges for many of the bridges and tunnels in Britain and similarly on some car ferries. Local authorities provide special transport which can accommodate wheelchairs, often for the purpose of taking the disabled to their own facilities in day centres and clubs. Arrangements can also be made for special hire rates for cars. British



Rail have made arrangements for the loan of wheelchairs to take disabled people from the train to a waiting vehicle and special wheelchairs for use in carriages; in some of the new rolling stock a table and seat can be removed to allow space for a wheelchair. British Rail are also installing special station toilets for disabled passengers and providing ramps at entrances to stations as far as possible.

*Social workers.* Support, advice and help is given to the disabled and their families by social workers. They provide information about available services and assess the need for particular services.

*Occupational therapists.* Some social services departments employ occupational therapists to visit disabled people at home and assess the need for adaptations to their homes and for other aids to daily living.

*Home helps.* Home helps are employed by local authorities to assist people with household duties and most of their work is devoted to the elderly (many of whom are handicapped). However, although they do make a considerable contribution to the care of younger handicapped people, many of these still receive little or no help. The service is expensive and much in demand. Many people receive only a few hours' help two or three times a week during normal working hours, which is usually totally inadequate to meet the needs of a severely disabled person.

*Home care attendance scheme.* These schemes have been a recent innovation in the service. An early one arose from a television programme – Crossroads – when a disabled person responded to an item in the programme and pointed out that his needs were different from the fictitious ones that had been portrayed. This resulted in a donation of money to pay the salaries of care attendants, who were able-bodied housewives, to give help to the disabled person at the same level as a caring relative might have done. Since then other schemes have been established and many are flourishing. Some are self-financing with the disabled people concerned making a contribution. These schemes have the additional advantage that because they are flexible (care can be given in the evenings or at night and weekends) there is the opportunity of temporary relief for a caring relative or family.

### *Residential services*

The type of residential accommodation needed by an individual depends on his requirements, but as with other fields of social policy, accommodation for the disabled has been provided in a piecemeal

fashion. With no coherent plan, the question of the most satisfactory solution has been left largely unanswered. Different agencies are involved in providing residential accommodation for the handicapped: the NHS, social services departments, housing authorities and voluntary organizations.

No charges are made for NHS accommodation, but some social services departments and voluntary organizations make charges in accordance with the handicapped individual's means. Local authority rent-rates rebate schemes, intended to help those on low incomes, are available to handicapped people who are registered with the local authority, on more favourable terms.

*Units for the younger handicapped.* These units, provided by the NHS, arose from concern that younger disabled people were being cared for in geriatric wards. It was estimated in the late 1960s that about 2000 severely disabled people under the age of 64 in England and Wales were being cared for in geriatric wards, of whom 74 were under the age of 35. The units were designed to provide accommodation for between 15 and 30 severely handicapped people accommodated in small wards, either singly or in groups of up to four. Originally they were called units for the younger chronic sick, but it was realized that the term 'sick' was an inappropriate description of most handicapped people.

The units have come in for considerable criticism from professionals, voluntary organizations and handicapped people themselves. The main criticism is that they are too hospital-oriented and segregated from the rest of the community. It is also argued that the approach of the health professionals in hospitals who are dealing with dependent patients is less likely to encourage handicapped people to be independent.

However, a high proportion of patients in these hospital units do require a substantial amount of care and attention. Their capacity for independent living is very limited unless adequate support is provided in the community, but some very severely disabled people are able to manage given such support.

*Residential homes.* Local authorities are empowered under Section 21 of the National Assistance Act, 1948 to "provide suitable accommodation for those who through age, infirmity or for any other reason are in need of care and attention which is not otherwise available". The main application of this Section of the Act has been to provide for the elderly, and to a much lesser extent, the homeless. Residential homes for handicapped people under retirement age represents only a tiny proportion of the total provision (10 600 places provided in 1980 in the UK for handicapped people under 65 years).

Voluntary organizations have attempted to fill the gap. The best known and the largest provider is the Cheshire Foundation Trust. Many local authorities pay for their residents to be placed in these homes.

*Boarding out.* Some local authorities have introduced schemes for placing less severely handicapped people in private homes, along similar lines to foster care schemes for children.

*Housing.* Most housing for disabled people is provided by local authorities, but some is also made available by non-profit-making housing associations. There are a number of warden-controlled sheltered housing schemes for disabled people along similar lines to those for the elderly.

*Wheelchair housing.* This type of housing is intended for those who are either completely dependent on a wheelchair for mobility or use it for a substantial period of time. The house is usually designed to meet the needs of a particular tenant. Thus, it is expensive and inflexible, and local authorities have provided a relatively small number of these houses.

*Mobility housing.* This is a standard type of house which has features designed to meet the needs of many handicapped people but can be equally well used by those who are not handicapped. It is cheaper, more flexible and more commonly provided than wheelchair housing. The main features are entrance, internal doors and corridors of at least 900 mm in width; level or ramped entrance; bathroom, toilet and at least one bedroom at entrance level. One northern industrial town which takes seriously its responsibilities for the care of the handicapped has under construction 500 dwellings up to mobility standards, but only 15 wheelchair dwellings.

*Adaptations to homes.* Aids and adaptations to the homes of handicapped people are usually provided by social services departments. They vary from simple aids, such as extra handrails, to more extensive provision in the form of additional prefabricated bathrooms and toilets and domestic lifts. This approach, the major thrust of housing policy for the handicapped in Britain, has the advantage of allowing people to remain close to neighbours, friends and relations in familiar surroundings.

*International schemes.* Some European countries have taken a different approach towards the problem of housing for the severely disabled. From the 1960s the Dutch have developed a special village for

about 400 handicapped people. This has many of the aids to daily living and encourages the severely disabled to live an independent life. The main criticism is that by segregating them in this way, they are divorced from the natural community and hence the mainstream of ordinary life.

In Sweden a voluntary organization known as the Fokus Housing Scheme started in the mid-1960s to provide flats for disabled people alongside ordinary dwellings. The scheme was regarded as very successful and was taken over by the State. Housewives living nearby are paid to help the more severely disabled residents of the flats, over three-quarters of whom are in wheelchairs, and about a third of whom need help to go to the toilet. About a quarter need help with cleaning and some are dependent on electronic aids. Yet, because of the scheme a relatively small proportion are housebound.

### **Aids and appliances**

Aids and appliances for the disabled vary from a simple device, such as a long-handled shoe-horn, to highly sophisticated electronic equipment. Aids to help a severely disabled person to take up employment or work at home are discussed elsewhere in this chapter. There are four main sources of advice and supply of aids and appliances for handicapped people.

- (a) *The National Health Service.* District health authorities operate a lending service, including equipment, which can help the handicapped. Bedpans, incontinence pads and pants are examples of the aids that are used in connection with nursing a patient at home. Wheelchairs may also be supplied on short-term loan. General practitioners can prescribe hearing aids and other specialized equipment or refer patients to a centre (e.g. a hearing-aid centre) to be fitted and supplied. Hospitals also supply aids for patients during the rehabilitation period after an injury or disease.
- (b) *DHSS Appliance Centres.* If the equipment is large, expensive or specialized the patient is referred to a DHSS Appliance Centre. These centres are administered and funded directly by the DHSS and there are over 20 of them in different locations. They supply wheelchairs of various types and fit and supply artificial limbs or eyes. Some also supply sophisticated electronic equipment, the best known of which is POSSUM. The word is shortened from Patient Operated Selected Mechanism and is also the Latin word meaning 'I can'. The equipment allows severely disabled people to control electro-

mechanical appliances with only slight muscular movement of the limbs or head, or by sucking or blowing.

- (c) *Social services.* Wide powers are given to social services departments under the Chronically Sick and Disabled Persons Act, 1970, to supply equipment and appliances. The range includes the supply of radio, television, books, telephone and various pieces of equipment to help handicapped people at home with daily living.

The determination of need is a matter for the local authority, hence there is a wide variation between authorities in the quality and variety supplied. Some local authorities mount exhibitions which can be visited by professionals and handicapped people.

- (d) *Voluntary organizations.* Many voluntary organizations concerned with handicapped people play a major part in giving advice on and supplying aids. Some organizations concentrate on aids and appliances for the disability with which they are concerned. For example, the Colostomy Welfare Group provides an important advice service for patients with a colostomy, to assist them in obtaining suitable appliances and equipment. Other organizations take a more general approach; for example, a comprehensive service intended mainly for professionals working with the disabled is provided by the Disabled Living Foundation. This group has a permanent exhibition in London and also provides mobile and touring exhibitions.

Criticisms are sometimes made by both professionals and the handicapped themselves that the arrangements for the supply of aids are fragmented, with too many organizations involved. However, to some extent this is an inevitable consequence of the diversity of aids and appliances required to meet the need of a heterogeneous group of disabilities.

## **SPECIAL CATEGORIES**

Although the facilities and services available are intended for all handicapped people, additional help is given to those with sensory loss.

### **Blind people**

The National Assistance Act 1948 defines blindness as “that a person should be so blind as to be unable to perform any work for which eyesight is essential”. The reference to *any* work in this definition does

not mean any particular type of employment. There is no statutory definition of partial sight.

### *Registration*

There are three categories of registration of the blind:

- (a) technically blind
- (b) partially sighted
- (c) partially sighted and entitled to use services appropriate to blind people.

The register is held and maintained by the social services department and participation is voluntary. A person is placed on the register following an examination by a medical practitioner with experience in ophthalmology (usually a consultant ophthalmologist). Absolute standards are not laid down, but usually someone with vision less than 3/60 for the Snellen chart or 6/60 together with restriction of visual fields would be regarded as suitable for registration as blind. Otherwise they may be registered as partially sighted. Total blindness is uncommon. A range of services provided by the social services department is available for those on the register, but only those registered as blind are entitled to financial benefits such as additional personal allowance for income tax purposes and a higher rate of supplementary benefit. There is, therefore, a greater incentive for people who are blind to be registered than those with other disablements and thus the number registered gives a more accurate estimate of the total numbers.

### *Extent of the problem*

Approximately 130000 people were registered as blind in the United Kingdom in 1980. About two thirds of these were female and 75% over 65 years (most of whom were over 75 years).

### *Causes of blindness*

Blindness occurring under the age of 15 is usually attributable to congenital abnormalities, cataracts or optic nerve atrophy. Preventive measures have reduced blindness due to retrolental fibroplasia and infections such as ophthalmia neonatorum. In the older age groups blindness is most often caused by conditions affecting the retina, sometimes associated with diabetes. In the elderly, glaucoma and cataract are frequent causes.

### *Services for blind and partially sighted persons*

Social services departments and voluntary organizations provide a wide range of services for people with serious visual handicaps. Newly-

blind people are helped to overcome problems of daily living such as shaving, making up, washing and cooking. They are also helped to become independently mobile with the use of long canes and other aids, as well as guide dogs.

Longer-term measures used in the rehabilitation of blind people include teaching them to read Braille and Moon, and touch-typing. Some of these services are more appropriate for the younger blind people rather than the very elderly. Many social services departments employ technical officers and mobility officers who visit blind people at home to provide help and support. The Wireless for the Blind Fund can arrange for any registered blind person in need of a radio to have one. The distribution is carried out by the social services department on behalf of the Fund. Free membership is available to blind people for the Braille National Library for the Blind and the Royal National Institute for the Blind has a large 'talking book' library.

Local authorities and voluntary organizations provide holidays for blind people and some special residential homes are available.

Braille dials can be fitted to most gas and electric cookers. Clocks and watches are available with special markings and embossed playing cards, chess, dominoes, draughts and other games are obtainable through social services departments or from voluntary organizations.

### *Employment*

Local authorities and voluntary organizations provide sheltered workshops and administer home-worker schemes for blind and partially sighted people. However, about two-thirds of the more than 10000 blind people in employment work in open industry. They are helped in this by the Blind Persons' Resettlement Officers of the Manpower Services Commission.

A number of occupations have traditionally become well-established for blind people. There are several two to three-year courses for piano-tuners, most of whom set up their own businesses. Training courses are also available for blind people who wish to take up audio and shorthand typing and switchboard operating. Physiotherapy is also popular with blind people, but many have a successful career in teaching, social work and the law as well as newer areas of employment such as computing.

### **Deaf-blind people**

About 2% of those on the blind register are also deaf; most are elderly people. A small number of people are deaf and blind without speech, mostly as a result of congenital defects. This small group of handicapped people require special help and a number of aids have

been devised to meet their needs. Most will qualify for attendance allowance at the lower rate.

### **People with impaired hearing**

People who suffer from disabling hearing loss such that they require welfare services are usually categorized on their condition and needs as follows.

- (a) *Deaf without speech*: Those with no useful hearing and whose normal method of communication is by signs, finger-spelling or writing.
- (b) *Deaf with speech*: Those who (even with a hearing aid) have little or no useful hearing, but whose normal method of communication is by speech and lip-reading.
- (c) *Hard of hearing*: Those who (with or without a hearing aid) have some useful hearing and whose normal method of communication is by speech, listening and lip-reading.

The first two categories are those who are deaf at birth or when very young and require specialized help.

### **Registration**

Participation in registration is voluntary and is not a prerequisite for help or services. The register is maintained by the social services department under the National Assistance Act 1948.

### **Extent of the problem**

A government-sponsored survey to determine the prevalence of deafness in Britain was carried out in 1947 to help estimate the number of hearing aids needed in the NHS. No further national survey has been conducted but, in 1975, the Statistics and Research Division of the DHSS updated the 1947 statistics using data from a variety of sources and taking account of the change in the age structure of the population. It was estimated that 2.4 million people over the age of 16 had hearing impairments in 1975, of whom 56% were aged 65 and over. About 60000 of the total were estimated to be suffering from very severe impairment: inability to hear speech at all, even with amplification. This estimate of prevalence is many times greater than the number on local authority registers. For example, in England in 1975 46000 persons on the registers were classified as deaf and hard of hearing, 14000 as deaf without speech, 12000 as deaf with speech, and 20000 as hard of hearing. The discrepancy is not so great for those who are deaf without speech (estimated prevalence is 18000), where registration is likely to be nearly complete.



### *Services*

A range of services is provided for deaf people by social services departments and voluntary organizations on similar lines to those for blind people. It is important to realize that the needs of the deaf without speech are different from those who are less handicapped by being able to speak. The deaf without speech are those who become deaf before they have acquired speech and thus special education methods are necessary. Some local authorities employ workers who can communicate with deaf people and provide a specialized casework service. The services of an interpreter can be provided by local authorities and voluntary organizations, as can training in manual communication methods and lip-reading for deaf people, their families and friends. Other services include recreation and social facilities, holidays and help with placement in employment and aids to daily living (special equipment such as flashing door bells, and sound amplifying devices are available).

### *Causes of deafness*

Congenital deafness may be caused by a variety of factors including maternal infections such as rubella or syphilis. Deafness may also follow infectious diseases such as mumps or measles, especially in children, or be caused by local infections of the ear or throat. Deafness in men of working age can have an occupational basis. In older people, loss of hearing (presbycusis) is a feature of the ageing process.

## **VOLUNTARY ORGANIZATIONS**

Throughout the chapter reference has been made to the role of voluntary organizations. There is probably no other group of disadvantaged people who can call on such a large number of dedicated voluntary workers. A plethora of voluntary associations exist which are centred on each of the sub-groups of the handicapped, as well as on groups defined by functional need. Their influence as pressure groups has helped to obtain better services for handicapped people, but they are also providing invaluable practical support in almost every conceivable field.

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## Mothers and children

### INTRODUCTION

Until about 60 years ago, childbirth was an event which threatened the life of both mother and baby. Deaths of women in labour were not uncommon and children's funerals were a prominent feature of life.

Through the ages children have been subjected to harsh and inhuman treatment, and until quite recently infanticide was regularly practised. Not everyone appreciates that the famous politician and Prime Minister of the last century, Benjamin Disraeli (1804–1881), was also a novelist. A quotation from *Sybil; Or The Two Nations* is an eloquent commentary on life at that time for some mothers and children in England.

About a fortnight after his mother had introduced him into the world, she returned to her factory, and put her infant out to nurse: that is to say, paid threepence a week to an old woman, who takes charge of these new-born babies for the day, and gives them back at night to their mothers as they hurriedly return from the scene of their labour to the dungeon or the den, which is still by courtesy called 'home'. The expense is not great: laudanum and treacle, administered in the shape of some popular elixir, affords these innocents a brief taste of the sweets of existence, and, keeping them quiet, prepares them for the silence of their impending grave. Infanticide is practised as extensively and as legally in England as it is on the banks of the Ganges: a circumstance which apparently has not yet engaged the attention of the Society for the Propagation of the Gospel in Foreign Parts.

From the beginning of the present century up to modern times there has been a steep decline both in maternal deaths and in mortality in the early years of life and later childhood. There is still considerable scope for improvement, however, an observation that is emphasized by the fact that many traditional inequalities in health – social and geographical, for example – persist.

This chapter begins with a description of the process of registration and notification of births. This provides the basis for the construction

of the common measures of fertility in a population. These are defined and the trends in fertility and the factors which influence it are discussed. A special section is given to a consideration of one of these: the methods, patterns and trends in the use of contraceptives and to the family planning services themselves. Abortion is also dealt with.

Antenatal care and the latest strategies for the prevention of disease or abnormality in the pre-natal period and in early childhood are discussed.

Maternal mortality and the special mortality rates covering the period of infancy are defined and the factors which influence these rates, their trends over time and patterns within the population are considered. Child abuse and battered mothers are discussed.

Services for children provided by the NHS and social services are given, with emphasis on special groups: pre-school and schoolchildren, children in care and children in trouble, and lone parents. Effects of recent changes in the legal framework such as the Education Act 1981 and the Child Care Act 1980 are taken into account, and schemes for financial support to families through the social security system are outlined.

## **BIRTH AND FERTILITY**

### **Registration and notification of births and stillbirths**

Registration of births and stillbirths is a legal requirement. The information is collected by the local Registrar of Births, Marriages and Deaths and forwarded to the Office of Population Censuses and Surveys in the form of a draft return, as with mortality data (see Chapter 1). Statistics are derived from these data about live births and stillbirths, fertility, duration of marriage and other demographic information which can help with planning services.

*Registration of births.* Every birth must be registered:

- with the local registrar
- by a parent or other informant
- within 42 days of birth.

Recorded in the register are date and place of birth, the baby's name and surname and its sex, the name and address and place of birth of parents, and occupation of father. Confidential information is also collected (but not entered in the register) which includes date of birth of mother, date of birth of father, date of parents' marriage, whether the mother was previously married, number of previous children (with

present and previous husbands) distinguishing whether live or still-born.

*Registration of stillbirths.* The same legal obligation, as with live births, exists to ensure registration of all stillbirths. The legal definition of a stillbirth is "A child which has issued forth from its mother after the 28th week of pregnancy and which did not at any time after having been completely expelled from its mother breathe or show any other signs of life". Recorded on the register by the local Registrar are the same details about the father and mother as with live births. In addition to the date and place of birth of the baby, for stillbirths, the cause of death and the nature of the evidence that the child was still-born are also entered in the register. This latter information is obtained from the death certificate signed by a medical practitioner or midwife who attended the birth or examined the body. The certificate also includes details of duration of pregnancy and the weight of the fetus. These last two details are recorded by the Registrar for statistical purposes, but do not appear on the register. In the same way, the confidential information about the parents described above under live births is also collected.

*Notification of births.* In addition to the process of registration of births, every live or stillbirth must be notified:

- to the District Medical Officer, as the prescribed officer of the health authority
- by the attendant at birth (usually the midwife or doctor)
- within 36 hours.

Amongst the items included in this notification are birthweight, length of gestation and parity of the mother.

It is important to understand that registration and notification of births serve different purposes. Registration is essentially intended to collect information for statistical purposes and is a more leisurely procedure. Notification is intended to alert health authorities to the birth of the child so that the necessary services can be brought into action to support the mother and her new baby. Here there is a need for urgency in passing on the information about the birth of the child. There is, however, exchange of information between the health authority and the registrar of births and deaths. The health authority passes brief information of the notification of births to the registrar as they are received in order to assist him in obtaining full registration. The only medical information which is transferred is birthweight. This important piece of information is a recent addition to the items

recorded by the Registrar. It is incorporated with their co-operation and is not a legal requirement. When added to the other data collected at birth registration, it allows statistics of live and still births to be compiled to include this important dimension.

### **Indices of fertility**

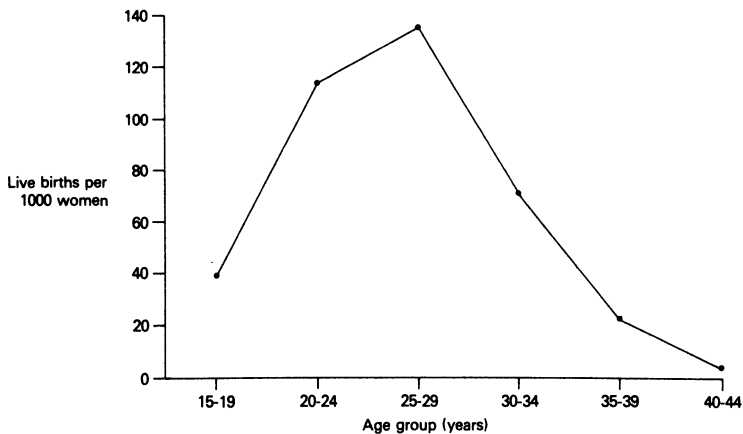
*Crude birth rate.* The number of live births expressed as a rate per 1000 total population per annum is the annual crude birth rate. Although often quoted, it is a poor indicator of fertility because included in the denominator are males, children and post-menopausal women, none of whom are producing children. (The limitations of 'crude' rates are discussed in Chapter 1.)

*General fertility rate.* A better denominator is used in the general fertility rate, which is calculated by expressing the number of live births per 1000 women in the population of child-bearing age (by convention this is usually taken as those between 15 and 44 years of age).

*Age-specific fertility rates.* Because there are differences in levels of fertility amongst women of different ages within the child-bearing years, an even more precise measure of fertility is obtained by calculating the number of births to a specified age group per 1000 women of that same age group. For example, the fertility rate for women aged 20–24 years is calculated by taking the number of live births occurring to mothers aged 20–24 years and expressing them per 1000 women aged between 20 and 24 years in the population. Study of age-specific fertility rates for England and Wales in 1980 (see Figure 6.1) indicates that peak fertility is amongst women aged between 25 and 29 years, with the lowest rates amongst women aged 40–44 years.

*Total period fertility rate.* The total period fertility rate is a convenient summary of all the age-specific rates. This rate is the sum of the age-specific fertility rates, in this case expressed as live births per woman of a single age, rather than per 1000 women. It measures the average number of live-born children per woman which would occur if the current age-specific fertility rates applied over the entire 30 years of the reproductive span. It therefore takes account of differential fertility within the different reproductive age groups, whilst providing a convenient summary measure in a single figure. The replacement of the population requires a total period fertility rate of 2.1.

*Cohort measures.* All indices of fertility so far described have referred



**Figure 6.1** Age-specific fertility rates (per 1000 women), England and Wales, 1980. Source: Data extracted from Office of Population Censuses and Surveys (1982). *Birth Statistics, 1980, England and Wales*. (London: HMSO)

to births at a specific period of time, most often a single year. However, births in any given year occur to a cross-section of women, married at different ages and with differing numbers of previous children. Temporary fluctuations in 'period' indices, such as the general fertility rate, may simply reflect the timing of child births within a reproductive lifespan, without any important change in the number of children women will have by the time they have come to the end of their reproductive years.

A cohort of women is a population of women who were born in a particular year (generation or birth cohort) or married in a particular year (marriage cohort). Modern studies of fertility have turned their attention much more to following such cohorts of women and observing the occurrence and timing of births in their reproductive lifetime. Cohort analysis provides a much more stable basis for commenting on trends and predicting future levels of fertility than do measures based on a specific period of time.

### Trends in fertility

Some of the historical trends in fertility have been discussed earlier (see Chapter 1) in the context of the factors which determine population growth. The fall in fertility during the economic depression of the 1930s stimulated considerable national concern about the long-term growth of the population. An increase in the birth rate occurred after the Second World War, since when fertility has been dominated by two

distinct trends. During the decade between the mid-1950s and the mid-1960s, the number of births, the crude birth rate, the general fertility rate and total period fertility rate all rose to a peak in the mid-1960s. The succeeding decade showed a sharp fall in the same indices of fertility. In 1976 and 1977 in England and Wales, the number of births was exceeded by the number of deaths. In 1977, the crude birth rate, the general fertility rate and the total period fertility rate all fell below their corresponding values in 1933, the previous lowest level of this century. More recently there has been an increase in fertility, though by 1980 general fertility rates were still well below those in the mid-1960s. Some of these trends are shown in Table 6.1. Changes in the fertility rates in the 1960s and 1970s have not been properly explained and were largely unpredicted. Hence major problems arose in providing health and education services. The story is well known; underprovision followed by overprovision of such facilities as schools, universities and maternity beds, as well as similar trends in training facilities for teachers and midwives. Some possible explanations of these changes in fertility are referred to in a later section.

### **Factors affecting fertility**

In few societies do women produce the maximum number of children of which they are physiologically capable. The number of children they will actually produce is influenced by a wide range of factors inherent in particular societies, such as marriage and cohabitation practices, sexual mores and practices and contraceptive practices, all of which are closely interwoven and complex to interpret.

*Fertility and fecundity.* The term *fecundity* means the biological or physiological ability of a woman to become pregnant; i.e. her reproductive capacity. In the usual clinical setting a woman who remained childless despite wanting and trying to have a child would be described as 'infertile' or 'sterile'. The term 'fertility' in this chapter is reserved as a description of the number of babies who are actually produced by a group of women and thus takes into account not only their fecundity (basic physiological potential) but the impact of other factors such as sexual activity and the use of contraception.

A number of important factors influencing fertility, both inherited and acquired and of a short- and long-term nature, affect the physiological reproductive capacity of both males and females. An example of acquired factors is infections such as gonorrhoea, tuberculosis or other pelvic inflammatory conditions which may prevent conception by causing scarring and blockage of the fallopian tubes. An influence,



**Table 6.1 Changes in various indices of fertility for selected years, England and Wales**

<i>Fertility indices for year:</i>	1933	1936	1939	1942	1945	1948	1951	1954	1957	1960	1963	1966	1969	1971	1974	1977	1980
Crude birth rate*	14.4	14.8	14.8	15.6	15.9	17.8	15.5	15.2	16.1	17.1	18.2	17.8	16.4	16.0	13.0	11.6	13.3
General fertility rate†	59.4	61.0	61.3	65.2	68.8	80.2	71.6	72.9	80.0	86.8	91.3	90.8	85.6	84.0	67.6	58.7	65.0
Total period fertility rate‡	1.72	1.77	1.83	1.92	2.04	2.38	2.14	2.20	2.45	2.66	2.88	2.76	2.48	2.38	1.90	1.68	1.90

\* Live births per 1000 population of all ages. † Live births per 1000 women aged 15–44 years. ‡ Average number of live births per woman (see text)

Source: Data extracted from Office of Population Censuses and Surveys (1982). *Birth Statistics 1980 for England and Wales*. (London: HMSO)

partly genetic and partly acquired, is the age of first menstruation (menarche). This seems to some extent to be hereditary and varies within individual populations. In general, however, a low age of menarche is associated with higher levels of affluence of a society. In Western countries the average age is lower than in African countries, an effect probably mediated through nutrition; better levels of nutrition in childhood lead to an earlier age of menarche. There is some evidence that earlier menarche is associated with later menopause (cessation of menstruation usually followed by cessation of reproductive capacity). Thus genetic and environmental factors in women may affect their span of reproductive life. There is no comparable clearly defined cessation in males, although sexual drive tends to fall off with advancing years.

### *Sexual practice*

The range and complexity of factors which determine sexual behaviour in society are enormous and include the influence of society's norms and expectations, the family, the law, social or psychological factors in individuals, religion and lifestyle.

### *Marriage*

About 88% of all births occur within marriage and although fertility outside marriage is an increasingly important consideration, it is still the case that the pattern of marriage, family formation and building is a major determinant of fertility.

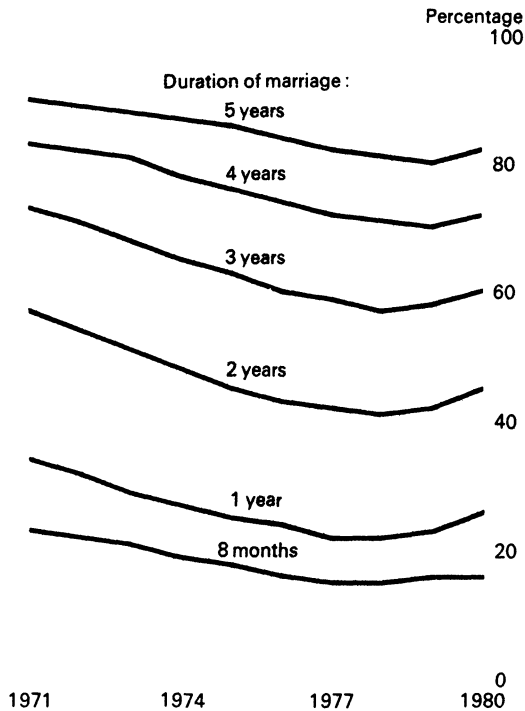
There are three main aspects of marriage which have important implications in terms of fertility:

- (a) the proportion of women who marry;
- (b) the average age of marriage; and
- (c) the degree of restriction of family size within marriage.

Other demographic forces play a part in determining the proportion of people who will marry at any one time. The availability of partners for marriage is important and has varied in this century because of excessive mortality of young males in wartime as well as outward migration. Economic circumstances may also have affected the tendency of people to marry.

Since World War II in Britain there have been three major trends in marriage, all of which have implications for fertility trends:

- (a) a tendency for more women to marry;
- (b) a move towards an earlier age at first marriage for single women;
- (c) an increase in the number of couples divorcing.



**Figure 6.2** First live births to women married once only: percentage occurring within specified duration of marriage. Source: Central Statistical Office (1981). *Social Trends*, No. 12. (London: HMSO)

At the turn of the century the average age of first marriage for women was 25.6 years and by 1974 this had fallen to 22.7 years. The impact of age at marriage on fertility is now complicated by the fact that an increasing number of marriages are remarriages, and that women may wish to have children with their new partner. Divorce rates have risen particularly sharply in England and Wales compared with some other European countries, a feature to some extent, of course, of differences in divorce legislation. One-third of marriages now end in divorce and in 1980 in one-sixth of marriages one or both partners had previously been divorced.

An important factor in determining fertility trends is the extent to which there is a deliberate limitation of family size within marriage. There are two dimensions to this issue: first is the question of ultimate family size, which is the main long-term guide to the trend in fertility, and second, the timing or spacing of children within a marriage. This is why cross-sectional (period) measures of fertility may be unreliable in

indicating trends in fertility. A married couple may defer the decision to have the child which they have planned, possibly because of short-term economic constraints, and may have it later within the mother's reproductive years so that ultimate family size is unaffected.

For cohorts of women whose reproductive span has been completed there is no doubt that ultimate family size has declined since the large families of Victorian times. However, from the relatively small completed family size (2.0) of the generation of women born in 1920, steady increases have occurred so that ultimate family size of women born in 1936 had increased to 2.4, with higher levels of fertility being maintained for women being born in the 1940s. It is too early to say what the experience of women born in 1950 will be, since they have not yet completed their reproductive life-spans, but indications are that ultimate family size will be lower for this group of women than for any previous generation.

The trend of postponing the start of families in marriage over recent years is well illustrated in Figure 6.2. In 1971, nine out of ten first births occurred within five years of marriage, compared with eight out of ten in 1979, although there was a slight reversal of the trend in 1980.

### **Theories to explain recent changes in fertility**

A number of explanations have been put forward to account for the changes in fertility which have occurred since World War II. Three common interpretations of the trends are as follows.

- (1) The widespread availability of modern contraceptive methods, particularly the introduction of oral contraceptives in Britain in the early 1960s. However, fertility fell in a similar way in the 1930s, when contraceptive technology was primitive. Trends in fertility similar to those seen in Britain over the last 20 years occurred in other industrial societies in Western Europe, North America and Australia, and not all had well-developed family planning services. It seems unlikely that the availability of the oral contraceptive pill is the entire story. If a couple decide to limit the size of their family, they can do so with or without modern contraception. However, modern contraceptive methods have made the limiting of the family size much easier without curtailing sexual activity.
- (2) Levels of income and attitudes towards future prosperity. Hence a parallel is drawn between the economic depression of the 1930s, which is considered to have been largely responsible for the reduction in fertility at that time, and the downturn in fertility in the early 1970s when an economic recession also prevailed. However, the decline in fertility had started well

before the financial crisis brought about by the increase in oil prices in 1973, so, once again, this cannot be the whole explanation.

- (3) More women of childbearing age now enter the labour force. It is believed that women restrict their family size in order to remain at work. In 1978, just over 60% of married women under 40 years were at work. However, the upward trend in the proportion of married women at work was just as steep during the rise in fertility in the early 1960s as during the decline in the 1970s.

It is probable that all three factors, as well as others, influence fertility in a complex manner that is not fully understood, an illustration of the difficulty in predicting trends in fertility even in the relatively short-term.

## **FAMILY PLANNING AND CONTRACEPTIVE MEASURES**

### **Contraceptive methods**

It is wrong to think of birth control as a strictly modern phenomenon: historical writings of ancient societies make mention of spermicidal agents concocted from herbs or other natural agents.

Since the 1960s contraceptive methods have been dominated by the so called 'high technology' measures – the oral contraceptive pill and to a smaller extent the intrauterine device (IUD).

Data indicating the usage of these different methods are routinely available in the form of statistics collected on people attending family planning clinics. This, however, represents a selected group not representative of the whole population. To give an impression of contraceptive practices of the general population it is necessary to undertake special surveys. The results of such a survey are shown in Table 6.2.

In the five year period between 1970 and 1975, use of the oral contraceptive pill increased substantially from 25 to 42% for women who did not wish to conceive. A similar increase took place in the use of IUDs, although it applied to a much smaller number of users. The same table shows that the condom fell slightly in popularity but was the most commonly used method after the 'pill'. The role of male (vasectomy) and female sterilization in controlling fertility is shown in Table 6.3. For example, a quarter of women aged between 35 and 39 years are infertile (infecund), the majority because of deliberate choice, i.e. sterilization of themselves or their partner to avoid conception. In older women the importance of infertility as a by-product of other surgical procedures or of the menopause increases.

**Table 6.2** Changes in contraceptive use between 1970 and 1975 – current use amongst ever-married women under 41 years

Current use of contraception	All women under 41 (%)		Fecund women (%)			
			Total		Those not pregnant nor trying to conceive	
	1970	1975	1970	1975	1970	1975
Withdrawal	14	5	16	6	19	7
Pill	19	30	21	36	25	42
IUD	4	6	4	8	5	9
Diaphragm	4	2	5	2	6	3
Condom	28	18	31	22	36	25
Safe period	5	1	5	1	6	1
Abstinence*	3	1	3	1	4	1
Other methods†	NA	3	NA	4	NA	4
None*	29‡	37‡	21	23	7	11
Base: No. of ever-married women under 41 (100%)§	2520	2344	2241	1913	1895	1655

\*In 1975 women no longer married are included in 'None': in 1970 they were included in 'Abstinence'.

†For 1975 'Other methods' includes combinations and alternations of methods also listed separately. For 1970, 'Other methods' would have included douching (negligible) and spermicides, which in most cases were used together with another method. 5% of those at risk were using spermicides or douching in 1970. ‡Includes women who were, or whose husbands were, sterile. §Percentages add to more than 100 because some people used more than one method

Source: Bone, M. (1978). *The Family Planning Services, Changes and Effects: A Survey Carried out on Behalf of the DHSS*. (London: HMSO)

Aside from the relative use, two other aspects are important when considering different contraceptive measures. The first relates to their effectiveness in preventing pregnancy and the second to their safety.

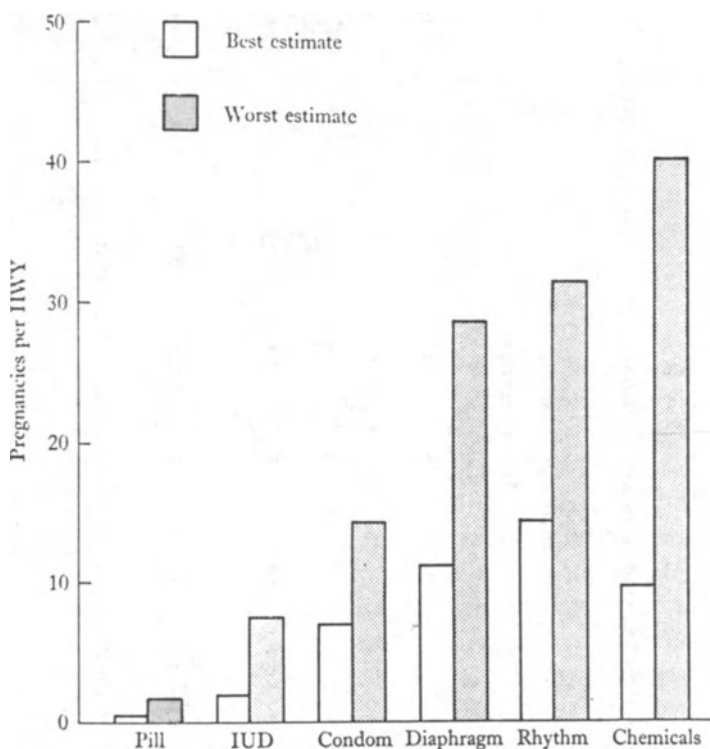
The effectiveness of the different methods of contraception is shown in Figure 6.3 in relation to the number of pregnancies occurring per 100 women-years of usage. The estimates are based on the use by individuals of various methods and thus reflect how competently they are used as well as the inherent effectiveness of the methods. The oral contraceptive has a very low failure rate on both best and worst estimates and failure rate is highest for the rhythm and chemical methods.

**Table 6.3 Sources of infecundity in 1975 in women or their husbands according to women's ages at interview - ever-married women under 56**

Stage and source of infecundity*	Fecund women (or their husbands) (%)									
	All ages	Age at interview								
		< 20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	
Fecund	70	100	97	90	78	75	73	63	26	
Infecund:										
sterilization	11	0	3	9	18	18	13	9	4	
other operation	6	0	0	1	1	3	8	11	15	
post-menopausal	10	0	0	0	0	0	2	13	52	
other causes	3	0	0	1	3	4	4	4	4	
Total infecund	30	0	3	10	22	25	27	37	74	
Base: No. of ever-married women under 56 (100%)	3898	42	372	661	601	558	531	514	568	

\*Includes 2% whose state is not known

Source: Bone, M. (1978). *The Family Planning Services, Changes and Effects: A Survey Carried out on Behalf of the DHSS*. (London: HMSO)



**Figure 6.3** Failure rates of contraceptive methods. Source: Peel, J. and Potts M. (1969). *Contraceptive Practice*. (Cambridge: Cambridge University Press)

Considerable controversy has surrounded the interpretation of the risks associated with the use of the oral contraceptive pill. Studies have indicated that its use is associated with certain forms of cardiovascular disease – in particular deep vein thrombosis and pulmonary embolism, myocardial infarction and stroke. The validity of these findings has been strongly challenged by other research workers and whilst there is still an area of controversy, there would seem to be broad agreement on the following points. The risk of death from cardiovascular disease is raised when high-dosage pills are used by older women, especially smokers or those with other risk factors for cardiovascular disease<sup>1</sup>. The move towards production of oral contraceptives with low amounts of oestrogen and progesterone, together with a move away from prescribing the pill for older women and those with risk factors for cardiovascular disease (e.g. hypertension), would seem likely to lead to a reduction in such deaths.



Precise risks of this and the other methods are difficult to determine. The data reported in Table 6.4 show estimates of risk, derived from different sources. Deaths due to adverse effects of oral contraceptive use are a particular problem in the older age group. Most doctors are now unwilling to prescribe the pill for older women, so that overall mortality may already be falling.

**Table 6.4 Estimated mortality rates associated with different methods of contraception in married women aged 25–34 and 35–44 years in England and Wales, 1975**

<i>Method of contraception</i>	<i>Mortality rates</i>	
	<i>25–34 years</i>	<i>35–44 years</i>
Oral contraceptives	4.4 per 100 000 women per year	33.0 per 100 000 women per year
IUDs*	0.3 per 100 000 women per year	0.3 per 100 000 women per year
Sterilization	10 per 100 000 operations	10 per 100 000 operations

\*Deaths unrelated to pregnancy

Source: Adapted from Beral V. (1979). Reproductive mortality. *Br. Med. J.*, 2, 632–634

Deaths resulting from the use of intrauterine devices arise either from sepsis as a complication of accidental pregnancy or from pelvic inflammatory disease not associated with pregnancy. It has been estimated that there is an excess mortality of approximately 0.5 per 100 000 women per annum using IUDs which is higher than shown in Table 6.4, where only deaths unrelated to pregnancy are considered. The nature of the risk from sterilization is different from both the other two methods described above. It is a once only risk associated with surgery and not arising from the sort of continuous exposure of the other two methods. It has been estimated to be about 10 per 100 000 operations.

### **The family planning services**

#### *Objectives*

The three main objectives of family planning are:

- (a) to improve the quality of life by allowing parents to have children when they want them;
- (b) to avoid unwanted children and also reduce the burden on public funds from some unwanted children being taken in State care; and
- (c) to limit population growth.

These various objectives will vary in importance according to the society which is being considered, although in many Western countries today it would seem that the first is the most important. The present shortage of babies for adoption makes it unlikely that many would become a burden on the State. Nor, so far as Britain in recent years is concerned, has population growth been a problem. Indeed, in some Western countries there has been concern about lack of population growth.

### *Historical perspective*

Family planning services in Britain started in the 1920s with a number of voluntary organizations. The first birth-control clinic was opened in 1921 and run by Dr. Marie Stopes. Her concern and that of the majority of the movement was with improving maternal and child health and increasing happiness in marriage, although there was a smaller faction whose philosophy was based on the eugenic arguments. A small number of clinics were opened initially and by 1930 the separate birth control organizations had united to form the National Birth Control Council (later renamed the Family Planning Association – the FPA). In tracing the development of the family planning service in Britain much credit must go to the work of this association. Its achievements represent a remarkable success for a voluntary organization, both in overcoming hostility from powerful influences in society and in the provision of a service within limited resources. In 1931, after sustained and prolonged pressure from the movement, the Ministry of Health gave permissive powers to local authorities to provide birth-control advice for women for whom further pregnancy would be detrimental to health. Although some individual authorities took up these powers at once, in many places the only clinics were those run by the FPA. As attitudes changed, this body began to work in conjunction with local authorities, often using their clinic premises. For nearly 40 years contraceptive advice was given only for ‘medical reasons’, although over the years this criterion became more liberally interpreted. In addition, both the Family Planning Association and most local authorities were reluctant to advise unmarried women. Indeed, ‘prospective’ brides were required to produce evidence of a forthcoming marriage. The National Health Service (Family Planning) Act, 1967 finally changed the law and gave permissive powers to enable local health authorities to provide birth control on social as well as medical grounds and regardless of marital status. There was then a substantial expansion of family planning services. They became accepted as an essential part of preventive health services, although the majority of authorities continued to use the FPA as agents. With the reorganization of the NHS in 1974, nearly all clinics provided by the

FPA as agents for the pre-existing local authorities were transferred to the NHS.

### *Services today*

Family planning services in Britain are now provided by:

- (a) obstetrics and gynaecology departments of hospitals;
- (b) approximately 2000 clinics in the community; and
- (c) over 90% of the 25000 general practitioners.

This is clearly a duplication of the service but it is regarded as acceptable because it allows the individual seeking contraceptive advice freedom of choice. Contraceptive advice and supplies provided by hospital and community clinics are given without charge to those consulting. Those prescribed by general practitioners are also provided without any charge, but not male contraceptives.

General practitioners are not obliged to provide a birth-control service, but the majority do so. Many have chosen to obtain a certificate as evidence of further training in family planning. GPs are paid on a fee-for-service basis. There were about 2 million attendances (100000 for intrauterine devices) in England and Wales for family planning purposes to GPs in 1980 compared with about 1.5 million to hospital and community clinics, but only 1.5% were male. Community clinics often have additional services such as cervical cytology, screening for breast cancer and marriage-guidance advice and, in some parts of the country, may be termed 'well women clinics'. Some may also provide a service for infertile couples and arrange for genetic counselling.

*Domiciliary family planning service.* This meets a special need, particularly for women with large families, mainly in Social Classes IV and V. Many schemes operate in Britain; most visit the women and provide advice and treatment at home. Others make arrangements for the family to be looked after when the mother comes to the clinic, with the transport provided if necessary. Health visitors play a key role in these services.

## **ABORTION**

Abortion too has a long history and is a feature of all civilizations irrespective of their legal system. Abortion is defined as "the emptying of a pregnant uterus up to the 28th week of pregnancy". A spontaneous abortion (often referred to as a 'miscarriage') is one which occurs as a result of an accident or disease – estimated as 9–15% of

recognized pregnancies. A criminal abortion is one procured deliberately and unlawfully.

In April 1968, the Abortion Act, 1967 became law and enabled the legal termination of pregnancy (by a registered medical practitioner) to take place in an NHS hospital, registered nursing home or other approved premises. It requires that two registered medical practitioners should certify that certain defined indications for abortion have been met. These include:

- (1) Where the continuance of the pregnancy would involve risk to the life of the pregnant woman greater than if the pregnancy were terminated.
- (2) Where the continuance of the pregnancy would involve risk to the physical or mental health of the pregnant woman greater than if the pregnancy were terminated.
- (3) Where the continuance of the pregnancy would involve risk to the physical or mental health of any existing children greater than if the pregnancy were terminated.
- (4) Where there is substantial risk of the child being born with serious handicapping physical or mental conditions.
- (5) Where certain emergency circumstances necessitate immediate operation (certification by one medical practitioner undertaking the operation).

Of these criteria the most commonly stated as grounds for abortion is the second: 86% of abortions are carried out indicating this as the statutory ground (see Table 6.5). In England and Wales all cases of

**Table 6.5** Legal abortions carried out in England and Wales (residents and non-residents) in 1979, showing statutory grounds for termination

<i>Statutory grounds*</i>	<i>No. of abortions</i>	<i>Percentage of abortions</i>
1	1036	1
2	128 726	86
3	2092	1
4	1321	1
5	13	<1
2 with 4	1086	1
3 with others	15 472	10
Total	149 746	100

\*See text for definitions

Source: Data extracted from Office of Population Censuses and Surveys (1981). *Abortion Statistics 1979, England and Wales*. (London: HMSO)

**Table 6.6 Legal abortions carried out on residents of England and Wales in 1979, by age of woman. Also shown are age-specific abortion rates**

<i>Age group (years)</i>	<i>No. of abortions</i>	<i>Percentage of total abortions</i>	<i>Abortion rate per 1000 women</i>
Under 15	841	0.7	—
15–19	31 885	26.4	16.80
20–24	29 647	24.7	17.46
25–34	39 003	32.3	11.42
35–44	16 977	14.1	6.06
45 and over	519	0.4	0.38
Not recorded	1739	1.4	—
All ages	120 611	100	11.97*

\*15–44 years

Source: Data extracted from Office of Population Censuses and Surveys (1981). *Abortion Statistics 1979, England and Wales*. (London: HMSO)

abortion must be notified to the Chief Medical Officer of the DHSS or the Chief Medical Officer at the Welsh Office within 7 days of termination .

Critics of the abortion law have considered that liberal interpretation of these indications has led to abortion on demand. Set alongside mention of technological advances which brought about the widespread availability of effective methods of contraception, the upsurge in the number of legal abortions since the introduction of the Abortion Act 1967 throws a harsh light on the adequacy of current birth control programmes.

In the first full year of operation of the Act (1969), 49829 legal abortions were carried out on women resident in England and Wales, 67% in NHS premises and 33% outside the NHS. A decade later (1979), the corresponding figure was 120611 (46% NHS; 54% non-NHS). There is no way of knowing, of course, the real extent of the increase since the number of illegal abortions which were performed before the Act is not known with any accuracy.

The largest numbers of women having abortions are aged between 25 and 34 years, although in terms of the proportions of the relevant populations, the highest abortion rates (per 1000 population) are in the younger age groups (15–19 and 20–24-year-olds) – see Table 6.6.

In 1979, 29135 abortions were performed under the Act (almost all outside the NHS) on women who were not normally resident in England and Wales. This represents a six-fold increase in the corresponding figure for 1969. Of such abortions carried out in England and Wales on non-residents, 77% were on women from other

European countries and 59% from Spain alone.

There are marked variations in the extent to which women obtain abortions within or outside their own health region and whether within or outside the NHS (see Table 6.7). In the Northern region, for example, a very high proportion (86%) of women obtained an abortion in their own region and in NHS premises. In contrast, only 20% of women in the West Midlands obtained an abortion under the NHS in their own region, the majority obtaining it in private clinics. Such discrepancies reflect differing attitudes to the provision of abortion services across the country.

Of 120611 legal abortions carried out on residents in England and Wales in 1979, 9% (11387) had had a previous abortion under the Act.

### **SERVICES FOR EXPECTANT MOTHERS**

For centuries women in labour were looked after by other women who had no special training. The delivery of a child to a mistress of Louis XIV by a court surgeon, Jules Clement, is said to have popularized the supervision of childbirth by doctors (at that time all men) and the term 'accoucheur' (man-midwife) was invented. However, the involvement of women in the conduct of labour persisted, many adopting the role of assistant or handywoman to the doctor, though there was still no formal training. Unsuccessful attempts were made during the eighteenth and nineteenth centuries to control the practice of midwifery, and to introduce training for midwives.

Eventually the Midwives Act, 1902 established the profession of midwifery. The Central Midwives Board was set up as a national registering and examining body and its powers and duties were extended by subsequent legislation. Major local authorities supervised the practice of midwifery within their own areas. Midwives thus became a major component in the care of the expectant mother.

Today, the care of expectant mothers is provided by several overlapping agencies. The first professional contact is usually the general practitioner. At this first attendance, 'booking' of place of delivery will usually be undertaken and a decision made about the arrangements for antenatal care.

The 'booking' or choice of place for the confinement is usually a decision made by the patient and her doctor together. In general, women at greater risk will be booked for delivery in a hospital obstetric unit whilst those at lower risk may be booked into a general practitioner maternity bed or unit. This may be modified as the pregnancy progresses. The orientation of services varies throughout the country. In some districts, the emphasis is very heavily on achieving a high proportion of births within the consultant obstetric units, often

Table 6.7 Places where women obtain abortions in relation to their region of usual residence, England 1979

Regional Health Authority of residence	Place where abortion obtained and type of premises (percentages)				Rate per 1000 women aged 15-49 years
	Own region, NHS	Own region, non-NHS	Outside region, NHS	Outside region, non-NHS	
Northern	86	1	1	12	100
East Anglian	73	3	1	23	100
South Western	70	10	5	15	100
Trent	52	17	3	28	100
Wessex	48	<1	2	50	100
Oxford	47	3	2	48	100
S.E. Thames	45	35	4	16	100
N.E. Thames	43	27	2	28	100
North Western	39	15	1	45	100
Yorkshire	38	35	2	25	100
N.W. Thames	35	13	4	48	100
S.W. Thames	29	8	7	56	100
Mersey	22	53	3	22	100
West Midlands	20	74	1	5	100
England	43	25	3	29	100

Source: Data extracted from Office of Population Censuses and Surveys (1981). *Abortion Statistics 1979, England and Wales*. (London: HMSO)

centrally placed. In many places, the tradition of general practitioner maternity units is strong, and the two models coexist and collaborate. Another variation is the siting of general practitioner beds within the same hospital as the consultant obstetric unit.

The proportion of planned home confinements is today very small and of the home deliveries which do take place, some will be hospital-booked patients who went into labour suddenly.

Hospital obstetric units normally require the pregnant woman to attend the hospital antenatal clinic at regular intervals. The procedures involved in antenatal care include weighing, blood pressure measurement, urine testing, samples of blood taken for grouping, haemoglobin estimation and other pathological investigations. Advice and support is given as well as physical examination. In many cases the general practitioner will share the care during the antenatal period, thus combining the advantages of convenience and familiarity with the expertise and high technology of the hospital. He may provide this care with a midwife who is part of the Primary Care Team. The general practitioner may be on the local obstetric list, but this is not essential. The service provided by the GP attracts a special fee.

## **PRENATAL PREVENTION OF DISEASE OR ABNORMALITY**

### **Elimination of risk factors**

Greater understanding of the fetal-maternal circulation led to the realization that not only was there exchange of oxygen, nutrients, waste products and antibodies as part of normal physiological functioning, but also the potential for harmful substances to cross the placental barrier.

It has long been recognized that syphilis in the pregnant woman can be transmitted to the fetus, leading to congenital infection with malformation of the nervous system. In the early 1940s it was discovered that rubella (German measles), if contracted by a pregnant woman in the early weeks after conception, could lead to fetal death or severe congenital malformations including cataract, deafness, cerebral damage and congenital heart defects. More recently, two other conditions which cause mild illness in the adult – toxoplasmosis and cytomegalovirus infection – have been implicated in the genesis of serious fetal abnormality if they are contracted by the mother during pregnancy. It is likely that other viruses and other infectious agents will be linked in this way as medical knowledge advances. At present primary preventive measures are restricted to problems in which risks are established: the detection and treatment of syphilis and immunization against rubella.



Secondary preventive strategies in these diseases include the routine serological screening of all pregnant women and immediate treatment if syphilis is diagnosed and serial serum testing of women with a history of exposure to rubella during pregnancy. If the latter is confirmed the option of abortion must be raised with the parents.

The elucidation of the role of the drug thalidomide in the production of serious congenital malformations (mainly affecting the development of the limbs) in the offspring of mothers who had taken it during pregnancy increased awareness of another group of risk factors for the fetus – medications.

The use of medication in pregnancy is widespread, and it seems likely that an increasing proportion of congenital abnormalities will ultimately be tied to specific therapeutic agents. Aside from encouraging research in this area, the main scope for prevention lies in health education measures (both of the medical profession and the public) to reduce, to absolute necessities, the use of both prescribed and non-prescribed medication in pregnancy.

There is evidence from animal studies of congenital malformations arising from nutritional imbalance. The risks to the human fetus of the presence or absence of specific factors in the diet of pregnant women are currently the subject of investigation and it is likely that there will be a role, here too, for preventive medicine in the future.

### **The process of antenatal care**

Many of the preventive measures described above come into the sphere of good antenatal care. Aside from its emphasis on the health of the mother, the whole process of antenatal care itself is geared to the prevention of fetal death, disease or abnormality by the early identification of disease or other problems in the mother or fetus and their treatment or control.

### **Other screening in the prenatal period**

#### *Rhesus haemolytic disease in the newborn*

This disorder arises from a genetic difference between a mother and her baby. Each member of the population belongs to one of four main blood groups: A, B, AB and O, but also falls into two other broad groups, rhesus-positive and rhesus-negative. In Britain, 85% of the population are rhesus-positive carrying the rhesus antigen (commonly the 'D' antigen) on their red blood cells. A rhesus-negative woman can conceive a rhesus-positive baby if she is fertilized by the sperm of a rhesus-positive man.

If at some time during the ensuing pregnancy, even if it ends in miscarriage or abortion, fetal (i.e. rhesus-positive) red blood cells pass

into the maternal circulation, then the (rhesus-negative) mother may respond by producing antibodies against the rhesus protein which has entered her blood stream. The risk is then that antibodies can cross the placenta and haemolyse the red cells of the fetus, producing anaemia, jaundice and possibly resulting in cerebral impairment or even death.

All pregnant women should be rhesus typed in early pregnancy and those who are rhesus-negative kept under surveillance with determination of rhesus-antibody levels during antenatal care. This enables the diagnosis to be made early, the pregnancy monitored and management planned.

Preventive measures are now available which could virtually eradicate this condition. After delivery if it is shown that a rhesus-negative woman has borne a rhesus-positive child, she is injected with rhesus-antibody (anti-D gamma globulin) within 72 hours of delivery. This destroys any fetal red cells before they can stimulate antibody formation. Similarly, a rhesus-negative woman who has an abortion or other procedure (e.g. amniocentesis) during pregnancy should also receive the antibody. These preventive measures have helped to accelerate the fall in morbidity and mortality from rhesus haemolytic disease. This decline was already established as a result of exchange transfusion carried out post-natally, intrauterine transfusion, and greater attention being given to the timing of induction of labour.

### *Down's syndrome*

The most important hereditary defect caused by chromosomal abnormalities is Down's syndrome, detectable in the antenatal period by amniocentesis. The condition occurs more commonly in children born to mothers towards the end of the reproductive period of their life, and is fully discussed in the chapter on the mentally disordered.

### *Neural tube defects*

The term neural tube defect (NTDs) is used for a group of disorders which arise from a failure of normal development of the central nervous system during the first few weeks of embryonic life, specifically the failure of proper closure of the neural tube. A spectrum of disorders may result depending on the site and severity of the defect, and may be classified as follows:

- (1) *Anencephaly* – failure of development of the forebrain, its coverings and the skull. This most serious defect is incompatible with life; affected infants usually die within hours of birth.
- (2) *Spina bifida occulta* – failure of fusion of the vertebral arches with no protrusion of tissue and seldom any neurological impairment.

- (3) *Spina bifida cystica*. There are two types:
- (a) *Meningocele* – This less serious and less common form consists of a protrusion of meninges, but not the spinal cord, through a defect in the vertebral column. The sac consists of spinal membranes and is covered by skin ('closed' NTD). After surgical closure prognosis is usually good, with minor residual impairment.
  - (b) *Myelomeningocele* – This type is more serious and more common (accounting for 80–90% of all spina bifida cystica births). In this 'open' NTD the protruding sac contains spinal cord which is partly uncovered. This defect often results in severe handicap of the nervous urinary and locomotor systems, even if surgical treatment is undertaken. Hydrocephalus and mental handicap may also be accompanying features.

NTD is a worldwide phenomenon with the UK a high incidence area, but there are also variations within the country. The incidence is highest in Northern Ireland, Western Scotland and South Wales and lowest in the South and East of England. The incidence of NTD has fallen over recent years most markedly for anencephalus (Table 6.8). There is a strong social-class gradient for the incidence of NTDs: they occur more frequently in Social Classes IV and V than in I and II.

**Table 6.8 Rates (per 100 000 total births) of anencephalus and spina bifida, derived from notifications of congenital malformations. England and Wales, 1974–1980**

	<i>Rates</i>							<i>Percentage change</i>
	1974	1975	1976	1977	1978	1979	1980	
Anencephalus	131	127	109	99	87	71	52	– 61
Spina bifida	183	181	149	153	140	131	114	– 38

Source: OPCS Monitor MB3 81/4. (London: HMSO)

**Prevention.** The aetiology of NTD is currently under investigation. It is known to occur more often in lower social classes and in women who have had a previous child with NTD. Recent work has shown that pre-conceptual supplements of vitamins may reduce the incidence of NTD in mothers who have a previous NTD baby, which suggests that there may be scope for primary prevention.

In the early 1970s it was noted that a substance called alpha-feto protein (AFP) was present in increased amounts in the amniotic fluid of women carrying babies with anencephaly or spina bifida. A later

discovery, that raised AFP levels could be detected in the serum (blood) of mothers carrying NTD fetuses, meant that there was major potential for secondary prevention through early detection (screening). The earlier finding of the association between raised levels of AFP in the amniotic fluid and an NTD fetus had a much more limited application. Amniocentesis is an invasive procedure which would prove impractical to carry out routinely on all pregnancies.

Initial serum testing must be undertaken between 16 and 18 weeks of pregnancy and combined with counselling to spell out to the patient the possible implications of a raised level of AFP. The accurate dating of a pregnancy is essential to the diagnostic process. Since the level of AFP alters as a normal pregnancy progresses it could be thought of as abnormal if the stage of gestation was incorrectly estimated. Ultrasound examination enables more accurate estimation of gestational age to be made. A positive serum AFP result, indicating abnormality, is dealt with by repeating the serum screening test, checking on gestational age, and searching for the presence of other abnormalities or of twin pregnancies (which can produce raised levels of AFP). If the test is still positive and alternative explanations have been eliminated, an amniocentesis will be performed, a procedure carrying a risk of induced abortion estimated at 1%. If the level of AFP in amniotic fluid is abnormally raised, then the parents, after further counselling, will be offered termination of the pregnancy.

The general criteria for evaluating a screening programme have been discussed elsewhere (see Chapter 3) and they apply equally to the consideration of antenatal screening for NTD. As discussed in Chapter 3, the validity of a screening test is reflected in the proportion of false positives and false negatives it produces. In the case of NTD, a false positive result would be a normal fetus which was aborted because the serum test and subsequent amniocentesis had mistakenly shown it to be affected. A false negative result would be the birth of an affected infant to a woman who had been tested and classified as carrying an unaffected fetus. The extent to which these events occur is determined by the selection of the cut-off point to discriminate against an abnormally-raised AFP level. Guidelines have been laid down after national studies<sup>2</sup>. Clearly also there is a need to ensure a high standard of quality control in laboratories performing the assay.

The introduction of a screening programme as a means of eradicating NTD is not a straightforward matter, however. A number of practical difficulties must be kept in mind. Firstly, closed NTDs do not result in raised AFP and are therefore not detected at all by screening. Secondly, although open NTDs result in raised AFP levels, anencephalic fetuses abort, are stillborn or die shortly after birth in any case. Thus, whilst most anencephalic births would be avoided by

screening and termination of pregnancy, the value of the programme here would be in averting distress to parents. The reduction in the number of surviving severely handicapped children relates solely to the role of the screening programme in avoiding the birth of babies with open spina bifida. The third, and most serious difficulty, is in obtaining complete or near-complete coverage of the population of pregnant women. Many women do not seek antenatal care, even from a general practitioner, until after the optimal time for screening, and there is evidence that those at greatest risk of having a NTD-affected fetus predominate amongst the late attenders<sup>3</sup>.

Prenatal screening for NTD is currently in operation in many parts of the country and there is a need for the most careful evaluation of the programme within individual health districts, taking account of the above considerations.

#### **POSTNATAL PREVENTION OF DISABILITY OR HANDICAP**

The role of preventive medicine in the period after birth and into childhood centres on the detection, early recognition and treatment of disease or other abnormality. A number of specific disorders are detectable by laboratory testing immediately after birth, an important one being phenylketonuria (PKU), an inborn error of metabolism which is described in Chapter 7. More recently screening for hypothyroidism has been introduced in many places and this condition is more common than PKU.

Physical examination of all newborn infants is aimed at detecting abnormalities early, so that if possible they can be corrected. One example of a condition with potentially serious consequences is congenital dislocation of the hip. The condition is more common in females than males. It is initially symptomless and when discovered is treatable. Each infant should be tested between 12 and 36 hours of age by means of a gentle abduction followed by Barlow's Test. Barlow's Test identifies dislocatable hips when the head of the femur can be moved either posteriorly or anteriorly out of the acetabulum.

In England and Wales in 1980, 25.3 cases of congenital dislocation of the hip were notified per 10 000 live and still births. This represented an increase over previous years, largely due to a change in the way the disease was coded in the International Classification of Diseases. The voluntary nature of the system of notification of congenital malformations and the fact that it relates to abnormalities discovered in only the early period after birth means that the above figure is likely to be a considerable underestimate.

## **MORTALITY**

### **Maternal mortality**

Improvements in the health of pregnant women, general medical advances (e.g. the advent of antibiotics and blood transfusion), together with improved standards of obstetric care have all contributed to a major decline in maternal mortality during the present century.

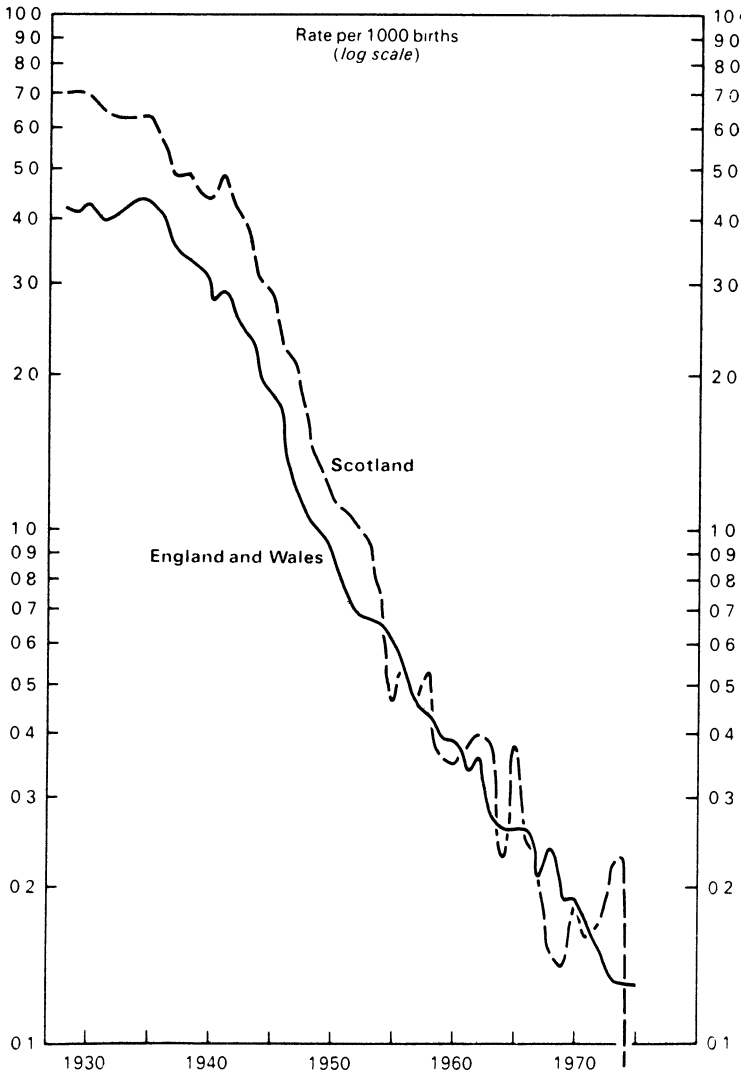
In 1890 there were 65 maternal deaths per 10000 total births in England and Wales. By the mid-1930s the figure had been reduced to 38 per 10000 total births. However, in the latter part of the 1930s, a major down-turn in maternal mortality commenced (see Figure 6.4). In 1950, there were 7.2 maternal deaths (from causes other than abortion) per 10000 total births; 30 years later, in 1980, this figure had fallen to 1 per 10000 total births.

Since 1952, a detailed confidential enquiry has been carried out into all maternal deaths in England and Wales. A similar enquiry operates in Scotland. Improvements in standards of obstetric care have been in part due to recommendations made in regular reports on maternal mortality based on these enquiries, which have highlighted areas where action was needed. A maternal death is defined as:

A death occurring during pregnancy or labour or as a consequence of pregnancy, within one year of delivery or abortion<sup>4</sup>.

The enquiry into such a death is voluntary and initiated by the District Medical Officer (DMO) of the district in which the death occurs. Using a standard enquiry form, he collects information from the various health staff concerned with care during pregnancy and delivery. The professionals involved may include general practitioners, midwives, consultant obstetricians, health visitors, community physicians, anaesthetists or other hospital staff. Post-mortem examinations are requested and details included where they are undertaken. The complete report, together with the DMO's comments, is forwarded to a senior consultant obstetrician in the same health region who acts as an assessor (and where indicated to a regional anaesthetic assessor). The assessor adds his opinion on the cause of death and the avoidability of the relevant events. The report is then forwarded to the Chief Medical Officer of the DHSS. The forms are analysed and commented upon by the DHSS consultant advisers in obstetrics and gynaecology and in anaesthetics who agree on a final diagnosis and identify any avoidable factors they consider to be present. Reports based on this analysis are published every three years and strict confidentiality is observed at all stages.

The latest report covers the years 1973–1975<sup>4</sup> and is based on



**Figure 6.4** Maternal mortality in England and Wales and Scotland, 1928-1975. Source: The Health Departments of Great Britain and Northern Ireland (1977). *Reducing the Risk: Safer Pregnancy and Childbirth*. (London: HMSO)

completed enquiries into 387 deaths and three additional deaths reported by coroners (an estimated 94% of total maternal deaths). Of these cases 235 were directly due to pregnancy or childbirth and 155 to associated causes. The four main causes of death for the 235 cases were:

- (1) hypertensive diseases of pregnancy (20.3 per million maternities);
- (2) pulmonary embolism (18.2 per million maternities);
- (3) abortion (15.1 per million maternities); and
- (4) sepsis (14.6 per million maternities).

Two other conditions occupied equal fifth place: uterine haemorrhage and ectopic pregnancy (10.9 per million maternities in each case).

An important aspect of these reports is that, after considering all the circumstances of each case the assessors attempt to decide "whether an alternative choice of action by any individual would have prevented or reduced the likelihood of death". This is the concept of 'avoidable' factors. It is an unusual feature of the NHS because it is the only national evaluation of the standard of health care. It involves identifying failure by professional staff to provide, or by patients to accept, advice and treatment.

Of the deaths directly due to pregnancy or childbirth in the period 1973-1975, nearly 60% were judged to have one or more avoidable factors. Out of a total of 230 avoidable factors, half occurred in the antenatal period, 29% during labour or an operative procedure and 21% in the puerperium or post-operative period. The responsibility apportioned for avoidable factors is shown in Table 6.9.

**Table 6.9** Distribution of 230 avoidable factors in the 1973-75 enquiry series (The numbers in this table are not mutually exclusive)

<i>Responsible person</i>	<i>Total of avoidable factors</i>	<i>Percentage</i>
Consultant obstetric unit staff	112	48.7
Patient	48	20.9
General practitioner	27	11.7
Anaesthetist	32	13.9
Midwife	5	2.2
Area Health Authority MO	1	0.4
Administration	5	2.2

Source: Department of Health and Social Security (1979). *Report on Confidential Enquiries into Maternal Deaths in England and Wales, 1973-1975. Report on Health and Social Subjects*, 14. (London: HMSO)



**Mortality in infancy**

In 1979 out of every 1000 infants born in England and Wales

- eight were stillborn;
- four died on the first day;
- three died during the remainder of the first week;
- one more by the end of the fourth week; and
- five more by the end of the first year.

Death rates in infancy are constructed differently from the mortality rates of later childhood and adult life (see Chapter 1). They use births occurring during the same period as the deaths, not the population of a particular age group as a denominator. 'Infancy' is taken as the first year of life and thus the *infant mortality rate* in a given period of time (usually a year) is the number of deaths of children under the age of one year (numerator) per 1000 live births in the same period.

The infant mortality rate has long been regarded as an important measure of the health of a community, but it is a rather crude indicator because deaths occurring during different periods of the first year of life usually reflect different groups of causal factors.

It has become customary to consider infancy in a number of different time periods:

- (a) *The perinatal period* – from the 28th week of gestation to the end of the first week of life (after birth).
- (b) *The early neonatal period* – the first week of life (after birth).
- (c) *The late neonatal period* – from the end of the first week to the 28th day of life (after birth).
- (d) *The neonatal period* – the first 28 days of life (after birth).
- (e) *The post-neonatal period* – from the 28th day to the end of the first year of life (after birth).

The various mortality rates are constructed around these different periods of infancy (see Figure 6.5). the numerator is all deaths occurring within the period of infancy in question (usually during a calendar year), the denominator is the number of live births during that same calendar year. The exceptions to this general rule are stillbirths (babies born dead after 28 weeks of gestation) and perinatal deaths (stillbirths plus babies dying in the first week after birth) where the denominator in each case is total births (i.e. both live and stillbirths). In other words, when stillbirths are included in the numerator then the denominator is total births, not live births alone.

The formal definitions of these rates are shown in Table 6.10.

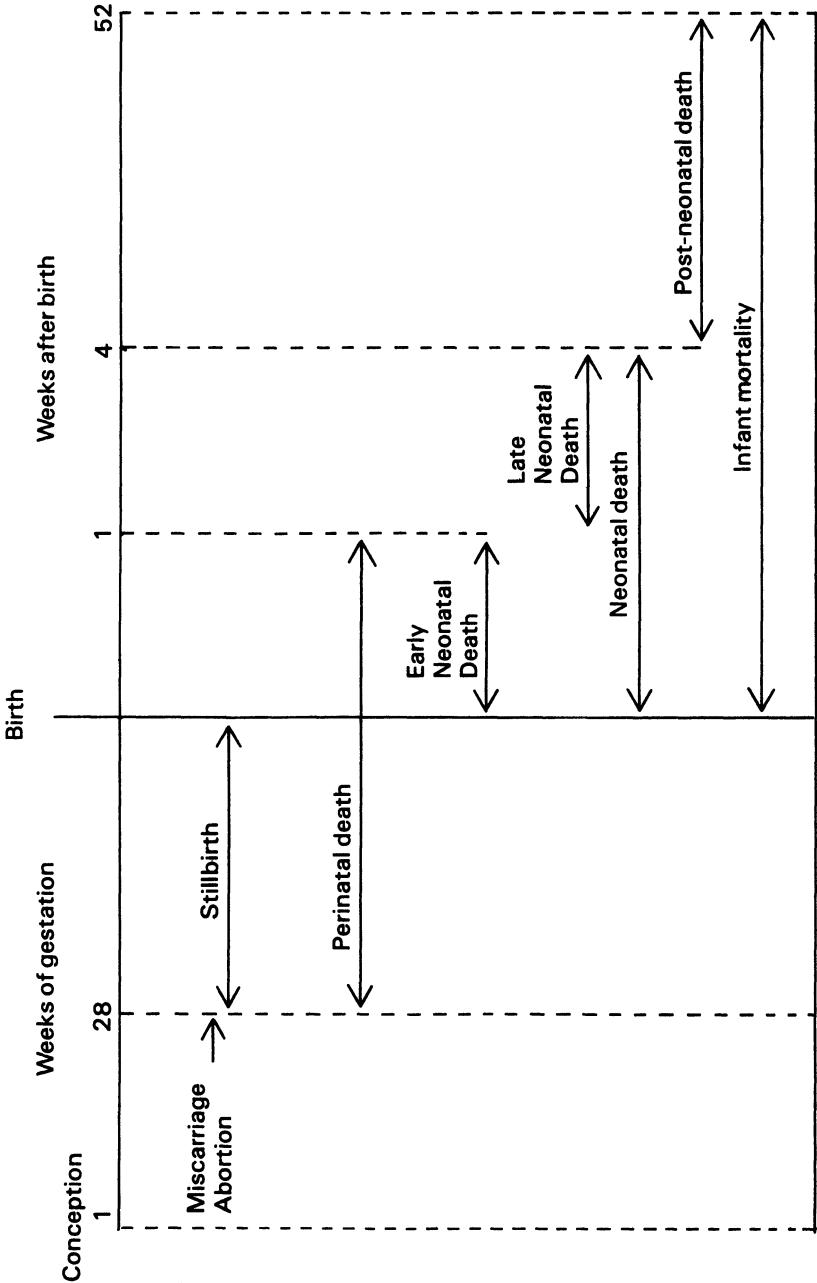


Figure 6.5 Subdivision of deaths in infancy

**Table 6.10** Definitions of annual\* mortality rates of infancy

● <i>Stillbirth rate</i>	Number of stillbirths per 1000 <i>total</i> births per annum
● <i>Perinatal mortality rate</i>	Number of stillbirths together with deaths in the first week of life per 1000 <i>total</i> births per annum
● <i>Early neonatal mortality rate</i>	Number of deaths in the first week of life per 1000 <i>live</i> births per annum
● <i>Late neonatal mortality rate</i>	Number of deaths between the 7th and 28th day of life per 1000 <i>live</i> births per annum
● <i>Neonatal mortality rate</i>	Number of deaths in the first 28 days of life per 1000 <i>live</i> births per annum
● <i>Post-neonatal mortality rate</i>	Number of deaths after 28 days but before the end of the first year of life per 1000 <i>live</i> births per annum

\*These rates are most frequently expressed per annum but may, of course, be calculated over other time periods. For example, seasonal variations have been observed by examining rates for different quarters of the year

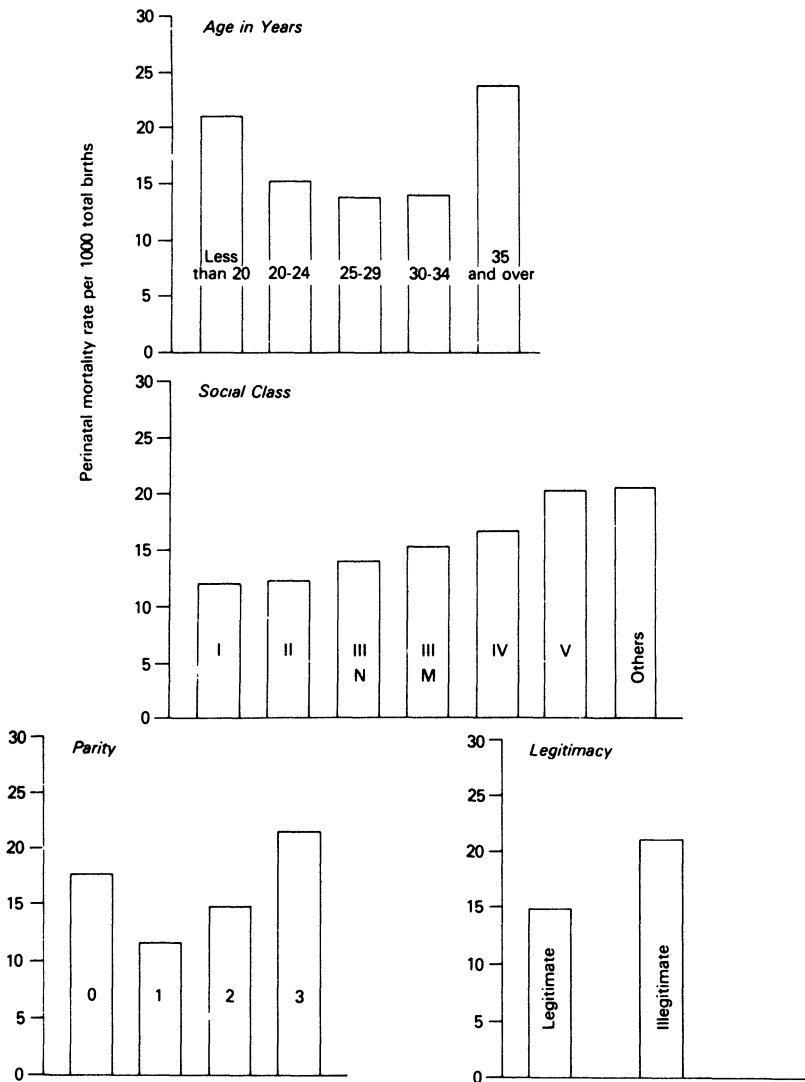
### *Perinatal mortality*

Amongst the reasons for using this index, which groups together still births and deaths in the first week of life, is that the factors responsible for these two types of death are often similar, being those operating before or around the time of birth. Another practical reason is that it overcomes some of the difficulties (particularly in making international comparisons) of variation between different localities as to which conceptuses are regarded as stillborn and which as having been born alive but died shortly after birth.

Four main maternal characteristics, whose relationship to perinatal mortality can be examined using routinely collected data, are of importance.

- (1) *Age*. Higher rates occur with very young and older mothers.
- (2) *Parity*. Highest rates occur for the first and fourth and subsequent children.
- (3) *Social class*. There is a steep gradient of increased risk in moving from the upper to the lower social classes.
- (4) *Legitimacy*. Rates are higher for unmarried mothers.

The influence of these factors on perinatal mortality is illustrated in Figure 6.6.



**Figure 6.6** Perinatal mortality rate in relation to various maternal factors; England and Wales, 1978. Source: Data extracted from Office of Population Censuses and Surveys (1982). *Mortality Statistics, Perinatal and Infant: Social and Biological Factors*. (London: HMSO)

In addition there are other variables whose effect cannot be examined using routine data collected by the Registrar General, yet special surveys have shown them to be important – e.g. cigarette smoking during pregnancy, small stature and adverse obstetric history (particularly hypertension during pregnancy). Recently, the Social

Services Committee of the House of Commons<sup>5</sup> has reported on perinatal and neonatal mortality. One of their many recommendations was that each Regional Health Authority should establish a Regional Perinatal Working Party (RPWP). In addition to a main function of monitoring obstetric and neonatal work within its boundaries, the RPWP is envisaged as conducting surveys of and making recommendations about obstetric and neonatal practice and, most importantly, participating in a review of perinatal deaths.

In some parts of the country such local enquiries into perinatal deaths were already under way. The Leicestershire Perinatal Mortality Survey, for example<sup>6</sup>, has provided valuable information not merely in confirming established risk factors but in emphasizing new, important associations of considerable relevance to planning of health education measures and health services provision. Such adverse factors include: late booking for antenatal care, Asian ethnic origin (particularly Hindu vegetarians) and a general practitioner who is not on the obstetric list<sup>6</sup>.

National mortality data show that the majority of deaths are attributed either to congenital malformation or to one of a group of causes such as conditions of the placenta and cord, anoxia and hypoxia, immaturity or birth injury (see Table 6.11). Low birth weight itself is a powerful risk factor. It is usually taken to be 2500 grams or less. Babies falling into this category comprised about 7% of all births in 1979, but 68% of perinatal deaths.

**Table 6.11 Perinatal deaths in England and Wales, 1979: Causes to which deaths were attributed**

<i>ICD Number*</i>	<i>Cause</i>	<i>No. of deaths</i>	<i>Percentage of deaths</i>
740-759	Congenital anomalies	2038	22
762	Conditions of placenta, cord or membrane	2185	23
768-770	Hypoxia, birth asphyxia and other respiratory conditions	1930	21
760, 761	Maternal conditions	894	10
764, 765	Slow fetal growth, fetal malnutrition and immaturity	663	7
767	Birth trauma	180	2
Remainder	All other causes	1512	15
All causes		9402	100

\*International Classification of Diseases number

Source: Office of Population Censuses and Surveys (1982). *Mortality Statistics, Perinatal and Infant: Social and Biological Factors 1978, 1979 England and Wales*. (London: HMSO)

Recently attempts have been made to rationalize the pathological classification of perinatal deaths in a fashion that facilitates clinical management and the planning of health services<sup>7,8</sup>.

### *Post-neonatal mortality*

After the neonatal period of life, deaths which occur in the remainder of the first year of life are predominantly a reflection of social and environmental factors.

This is indicated not only by the increasing rate with the lower social class groups (as with perinatal mortality), but by the causes to which post-neonatal deaths are attributed. Infections, particularly respiratory and gastrointestinal, are important causes of death in this age group, as are accidents and sudden unexpected deaths ('cot' deaths). Congenital anomalies are also prominent, but the differential between the social classes is less for this cause of death (Table 6.12).

### *Changes over time in mortality during infancy*

At the end of the last century, about 150 children in every 1000 live births died during the first year of life. The decline in this rate has been consistent and dramatic: by 1936 it had fallen to 58.7, by the beginning of the 1960s it had halved again and by the late 1970s it was around 13 deaths per 1000 live births (Table 6.13).

**Table 6.12 Post-neonatal mortality rates, England and Wales, 1970-1972 (average annual rates per 1000 live births)**

<i>Social class</i>	<i>All causes</i>	<i>Pneumonia, bronchitis, etc., ICD 466-490</i>	<i>Diarrhoea, enteritis, etc., ICD 008, 009</i>	<i>'Sudden unexpected' deaths, ICD 795</i>	<i>Accidents, ICD E800-999</i>	<i>Congenital anomalies, ICD 740-759</i>
I	2.9	0.9	0.1	0.1	0.2	0.9
II	3.7	1.2	0.2	0.2	0.2	0.3
III (non-manual)	3.9	1.3	0.1	0.2	0.3	1.1
III (manual)	5.6	2.2	0.3	0.3	0.4	1.2
IV	6.9	2.7	0.4	0.3	0.5	1.3
V	13.1	5.6	0.9	0.7	1.4	2.0
Ratio V:I	4.5	6.2	9.0	7.0	7.0	2.2

Source: Derived from Pharoah, P.O.D. and Morris, J.N. (1979). Post-neonatal mortality. *Epidemiol. Rev.*, 1, 170-183

**Table 6.13** Changes in death rates in infancy over time, England and Wales

<i>Time period</i>	<i>Index</i>		
	<i>Infant mortality rate</i>	<i>Perinatal mortality rate</i>	<i>Post-neonatal mortality rate</i>
1906–1910	117.1	—	76.9
1936	58.7	60.8	28.5
1951	29.7	38.2	10.9
1961	21.4	32.0	6.1
1971	17.5	22.3	5.9
1979	12.8	14.7	4.6

Source: Extracted from: Office of Population Censuses and Surveys (1981). *Mortality Statistics: Childhood and Maternity*. Series DH3, No. 6. (London: HMSO)

This marked decline in infant mortality dates back to the turn of the century. The decline is unlikely to have been due to a single event. Better nutritional standards, better education and improved environmental conditions of the large working-class population of late Victorian England, as well as the emergence of the middle class, all contributed. Improvements in medical care played a part even if they were not the most important. The Midwives Act, 1902 phased out the unqualified handywoman and reduced the amount of dangerous intervention in labour.

Although records have been kept for a shorter time, there has been a concurrent fall in perinatal mortality rates. The improvement in perinatal mortality has been particularly great during the latter years of the 1970s. In part this must be due to the changing pattern of fertility over the same period of time. A fall in the birth rate coincided with fewer births occurring to older women and those in the high parity and low social-class groups, all high-risk categories. However, these demographic changes are unlikely to account for the whole fall. The role of improvements in obstetric care and a greater move towards hospital delivery are difficult to discern, but they have almost certainly made an impact.

A similar decline also took place in the post-neonatal mortality rate, but as Table 6.13 also shows the decline appeared to level off between the early 1960s and the beginning of the 1970s. A further decline occurred, however, by the end of the 1970s, largely explained by a reduction in respiratory and infectious diseases.

### *Persistence of inequalities*

There is little room for complacency in these trends. Despite the overall

**Table 6.14 Male mortality rates at different periods of infancy in Social Classes IV and V as a percentage of Social Class I, 1970–1972**

<i>Period of infancy</i>	<i>Class IV as a percent Class I</i>	<i>Class V as a percent Class I</i>
Still births	148	199
Perinatal	145	195
Early neonatal	143	192
Late neonatal	164	249
Post-neonatal	211	421
All infant mortality	162	255

Source: Adapted from: Department of Health and Social Security (1980). *Inequalities in Health: Report of a Research Working Party (the Black Report)*. (London: DHSS)

decline considerable inequalities exist. The role of social class has already been raised, but it should be noted that a considerable social-class gradient exists for deaths in all periods of infancy (see Table 6.14). The infant mortality rate for children of Social Class V families is more than two and a half times as great as that for those in Social Class I homes. The gradient for the post-neonatal period is greater than for any other period of infancy. It should be noted, however, that recently this gradient has begun to narrow, with a disproportionate improvement for the Social Class V infants.

Within the UK there is considerable geographical variation for the death rate of infants in all periods. Northern Ireland, Scotland and northern England have consistently higher rates than the southern and eastern parts of England. Figure 6.7, for example, shows the variation in infant mortality in 1980. Some of the northern industrial areas have had infant and perinatal mortality rates 50% higher than areas in the rural south. It is difficult to be sure about the reasons for these differences. However, it is true that differences exist within the social class structure of the population as well as factors such as the environment, levels of employment of women, quality of housing and the level of health services provision all of which may affect the infant mortality rate.

### *International differences*

Despite the remarkable improvement in mortality in infants in Britain, some other countries have made better progress. Sweden, for many years, has been the leader and Finland, which 30 or 40 years ago had much poorer rates than Britain, is now approaching the Swedish performance. Rich countries like the USA and Germany have not done so well and continue to lag behind England and Wales. The USSR, with its comprehensive, centrally organized health care, has infant mortality



rates 50–100% higher than those in England and Wales, but it is a vast country with widely differing populations.

In post-neonatal mortality, for which socio-economic and environmental factors are of greater importance, a comparison between England and Wales and Scandinavian countries shows that a higher rate for the former is largely accounted for by a high occurrence of



**Figure 6.7** Infant mortality rates (per 1000 live births) for English Health Regions, and Wales, Scotland and Northern Ireland, 1980. Source: Data for England and Wales extracted from Office of Population Censuses and Surveys (1982). *Mortality Statistics 1980, England and Wales; Childhood*. Series DH3, No. 8. (London: HMSO). Data for Scotland and Northern Ireland obtained directly from relevant information offices

infective and respiratory disease. Indeed, in the countries where post-neonatal mortality is lowest, the greater proportion of deaths are due to congenital malformations (see Table 6.15) suggesting perhaps a barrier to further improvement until medical advances permit the prevention of a greater proportion of congenital malformation.

It is difficult to determine the reasons for international differences in infant death rates. Much has been made recently of schemes which made the payment of maternity benefits conditional on attendance for medical attention. This particularly applies in France, but it is hard to find good evidence that this has been responsible for improvement. The payments are not permanently withheld, just delayed.

**Table 6.15 Causes of post-neonatal mortality (rates per 1000 live births) in England and Wales compared to Scandinavian countries, 1976**

<i>Cause</i>	<i>Post-neonatal mortality rates</i>		
	<i>England and Wales</i>	<i>Norway</i>	<i>Sweden</i>
Infective and parasite diseases, ICD 000-136	0.24	0.09	0.10
Diseases of the nervous system and sense organs, ICD 320-389	0.18	0.11	0.18
Diseases of the respiratory system, ICD 460-519	1.45	0.60	0.12
Congenital anomalies ICD 740-759	0.96	1.22	0.97
Symptoms and ill-defined conditions, ICD 780-796	1.01	0.99	0.41
Accidents, poisoning and violence, ICD E800-999	0.35	0.30	0.09
All causes	4.60	3.80	2.00
Percentage attributed to congenital malformation	21	32	49

Source: Adapted from Pharoah, P.O.D. and Morris, J.N. (1979). Post-neonatal mortality. *Epidemiol. Rev.*, 1, 170-183

### **Sudden infant death syndrome**

This syndrome is variously described as 'cot death', 'sudden unexpected death in infancy', or 'sudden infant death syndrome' (SIDS). It has been defined as:

the sudden death of an infant or young child, which is unexpected by history, and in which a thorough post-mortem examination fails to demonstrate an adequate cause of death<sup>9</sup>.

Although, in the most recent revision of the International Classification of Diseases (see Chapter 1) sudden infant death syndrome is assigned its own category, the extent to which this condition is mentioned on death certificates is variable. This is particularly a problem in interpreting trends over time, since there has been increased interest and recognition of the condition since the early 1970s. A high proportion of death certificates in such cases will be completed by the Coroner, so that there is scope for variation in interpretation of what constitutes such a death. It is also likely that a proportion of deaths ascribed to respiratory causes will also be SIDS.

A recent report<sup>10</sup> on the SIDS has estimated its incidence at about 2 per 1000 live births. The peak frequency is in babies aged between 2 and 3 months, boys are affected more often than girls and it is more common in the winter months. Babies at greatest risk are those born to younger mothers who already have two or more children, risks are lowest in babies who are born to older mothers with no previous pregnancies.

### **Mortality in childhood**

Beyond the first year of life, mortality rates for the remainder of childhood (until the age of 14 years) are expressed in relation to the numbers in the population at risk.

Deaths in childhood, like mortality in infancy, have undergone major decreases since the turn of the century. In 1901, one in 112 children between the ages of 1 and 14 died. By 1930 this figure had improved to one in 263 and by 1980 it was one in 3248 for children of this age in England and Wales.

The main reason for this improvement has been a major reduction in the importance of infectious diseases as a cause of death in this age group. In the 1930s one in every two childhood deaths were attributed to one of five diseases: pneumonia, tuberculosis, diphtheria, measles and whooping cough. The change has been brought about by a combination of socio-environmental changes (such as improvements in standards of nutrition, housing and sanitation), preventive (immunization) and therapeutic (specific therapies) medical advances. This decreased importance of infectious diseases means that the mortality rates within the different phases of childhood (conventionally 1–4 years; 5–9 years; and 10–14 years) are lower than at any other period of life.

Changes have, despite the overall decrease, highlighted other conditions, which, as they have assumed greater importance, have become urgent targets for preventive measures. Accidents are now responsible for one-third of childhood deaths (half of these are road accidents) compared with less than one-tenth in 1930, despite the fact

that there has been a 40% reduction in the actual number of these deaths in the same period. The next most frequent cause of death is cancer, mainly leukaemia, an area where preventive strategies await breakthroughs in knowledge about causation.

In childhood mortality, inequalities amongst different social groups persists. There is a marked upward gradient in mortality for both boys and girls from Social Class I to Social Class V. For boys the ratio of mortality in Social Class V as compared to Social Class I is about two to one and somewhat less for girls. The gradient is less marked as children become older. The steepest gradients are for accidents and respiratory disease (see Figure 6.8). Deaths by fire, falls and drowning for boys were ten times greater in Social Class V than Social Class I.

### **CHILD ABUSE, INCLUDING NON-ACCIDENTAL INJURY**

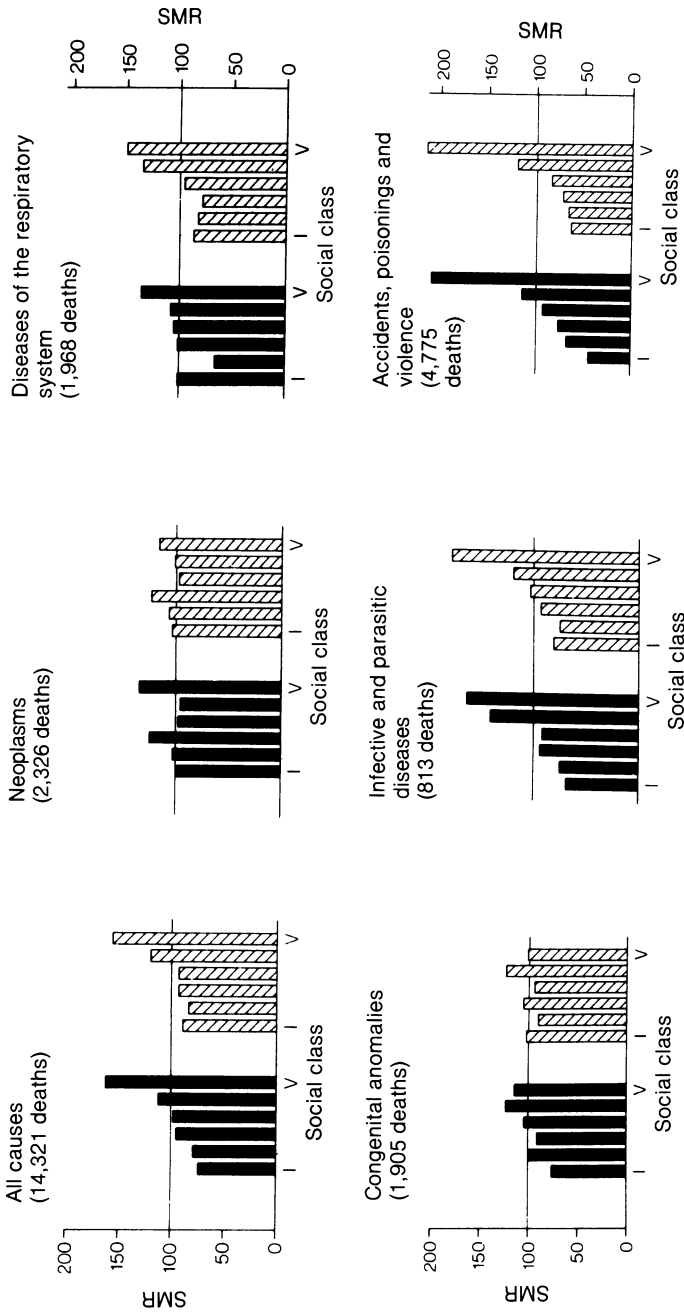
Although injury to children by their parents is not a new phenomenon, it only became widely recognized in the early 1970s. In 1962, the term 'battered child syndrome' was first used by an American paediatrician, Dr Kempe, and was taken up by the media. It was of major importance in introducing the problem to professionals and the general public.

In Britain, widespread attention was first focused on it in 1974 following the DHSS inquiry into the death of 7-year-old Maria Colwell. This inquiry uncovered serious deficiencies in professional expertise and in the response of services and its main historical importance is that it acted as a stimulus to the establishment of a procedure for dealing with the problem.

There has since been at least one major public inquiry per year into a child death in the home. The most recent of these was the 1985 inquiry into the death of three-year-old Jasmine Beckford, who, like Maria Colwell, was beaten to death by her stepfather. This inquiry had a major impact and, like the others, found evidence of failures in professional practice and co-ordination of services.

### **The nature of the problem**

Earlier terms such as 'battered children' or 'battered babies' have now been subsumed in the concept of child abuse, which encompasses not only *non-accidental injury* (actual physical injury inflicted on the child), but also physical neglect and deprivation. Emotional injury, neglect and failure to thrive are seen by many as of equal importance, though they are much more difficult to quantify. Sexual abuse has recently become more widely recognized and is receiving a great deal of public and professional concern.



**Figure 6.8** Class and mortality in childhood (males and females, 0–14 years). ■, males; ▨, females. Source: Adapted from Office of Population Censuses and Surveys (1978). *Occupational Mortality Decennial Supplement, 1970–1972*. (London: HMSO)

**Size of the problem**

It is estimated that there are about 5000 cases of child abuse in Britain each year. This is probably just the tip of the iceberg and many more cases go unrecorded. Indeed, accurate figures are not available for either the number of deaths or the number of injuries. For example, estimates of the number of deaths from child abuse in a particular year have ranged from 100 to 700. There is also the problem of permanent handicap (including mental handicap) which results from child abuse, but again this is almost impossible to quantify fully.

**Characteristics of children and families**

Many of the assumptions held about the characteristics of the children and families involved in abuse are based on impression. It is widely accepted, for example, that marital disharmony is present in many cases and that many parents have immature personalities. Firm conclusions are difficult to draw from published studies because of potential biases inherent in the methodology used by some of them. Table 6.16 summarizes some of the main features of children and families which have emerged from studies. Although they are helpful in describing the problem, they are of less value in singling out factors which are predictive of child abuse, establishing causal relationships and characterizing 'typical' child-abuse families. For example, there are many people with marital disharmony but only a very small proportion are involved in child abuse. Similarly, it should be emphasized that child abuse occurs in all social classes, although it is more common in families of Social Classes IV and V.

**Clinical features**

Typical injuries are multiple bruising (particularly of differing ages) and lacerations. Facial bruising associated with gripping the face is quite common, as are finger-tip bruises of the back or trunk indicating that the child has been gripped and shaken. A torn frenulum of the upper lip may occur if a feeding container is forced into the mouth. More serious injuries are fractures of the long bones, ribs and head injury (most seriously subdural haematomata) which may or may not be associated with skull fracture. Such injuries are caused by pulling, twisting or shaking the child or less often by direct blows. Internal abdominal injury (e.g. ruptured spleen) may also occur, and burns produced by lighted cigarettes or other means (e.g. immersion in hot water) are another form of physical abuse.

The signs of physical neglect may include undernourishment, retarded growth and inadequate hygiene.

The initial interpretation of the physical signs of injury in a child includes consideration as to whether the injury is accidental or non-

**Table 6.16 Main features of children, parents and families which have emerged from studies of child abuse\***

<i>Children</i>	<i>Parents</i>	<i>Families</i>
Younger age distribution than expected	Younger than average	High mobility/frequent change of home
More likely to be premature/low birth weight	Deprivation in parental histories	Larger than average family size
Boys more at risk than girls except in adolescence	Rigid attitudes to discipline	Atypical family structure (i.e. higher proportion of step parents etc.).
Most serious injuries inflicted on youngest children	Ignorance of normal childhood behaviour and development	Marital discord
Children more likely to be illegitimate	Impulsive behaviour/low tolerance of stress	Low social class
	High incidence of personality disorders	High unemployment
	Distorted perception of child	
	High rate of general criminality	

\*See text for discussion of limitations of these data

Source: Extracted from Jones, D. N. (ed.) (1982). *Understanding Child Abuse*. (London: Hodder and Stoughton (Teach Yourself Books))

accidental. It is impossible to lay down strict criteria but certain features suggest that abuse is more likely, e.g. the nature and pattern of the injuries themselves and implausible accounts of how they occurred inconsistent with the type of injury. Suspicion should also be aroused when there has been delay in seeking treatment or when the reactions of the parents are unusual, e.g. a dispassionate attitude or extremes of aggression and distress (although the latter may be difficult to distinguish from a 'normal' parental response to accidental injury).

### **Identification and referral of cases**

A potential case of child abuse may present along with the parents to a general practitioner, or more often to a hospital accident and emergency department. Alternatively, the case may be detected by a professional worker (e.g. health visitor, social worker, school teacher) or a suspected case may be brought to the attention of the social services department or the police through a wide variety of concerned sources, e.g. a relative, friend or neighbour. In all cases the first stage is to undertake a full and thorough medical assessment.

### *Medical assessment*

A full medical assessment is indicated in all cases of child abuse. This will include a full history and physical examination as well as X-ray and other investigations. Meticulous recording of information including clinical photographs, where necessary, is essential. In the normal course of events the child will be admitted to a paediatric unit with the diagnosis of suspected non-accidental injury, and it is there that the full assessment and medical treatment will take place.

### *Place of safety*

A formal Place of Safety Order may be brought under relevant legislation by application to a magistrate if certain conditions are fulfilled. It allows the applicant (e.g. from social services department, police, NSPCC) to remove a child to a place of safety, e.g. hospital, community home, foster home for a period of up to 28 days as directed by the magistrate.

### *The case conference*

If there is a reasonable suspicion of deliberate injury, the course of action to be taken is decided upon following a multidisciplinary case conference to consider information from all sources, which will include an investigation by the social services department and maybe also by the police. The evidence will be evaluated and a policy for action formulated, allocating responsibility to the different services and agencies involved.



### *Action*

When the child is fit for discharge from hospital, subsequent events will depend on the circumstances of the case. As discussed above, an initial plan of action will have been formulated by the case conference. A child may be returned home with supervision of the family by the social services department and health authority, either on a voluntary (informal) basis or as a result of a court order. In other more serious cases on a voluntary basis or after court proceedings, the child will be taken into care by the local authority. The child may then be retained in care or returned home at some later date. A full discussion of the legislative basis of child care is given in another section of this chapter. In a minority of cases, usually those in which the injuries are most serious, the parents will be prosecuted in a court of law.

### *Joint Child Abuse Committees*

Area Review Committees were established in 1974, but have since been replaced by Joint Child Abuse Committees. These were set up in 1986 at the recommendation of the Government circular 'Child Abuse – Working Together'. They are accountable to the Joint Consultative Committee in each area and are thus felt to have a more clearly recognized relationship to the responsible agencies. Members include officer representatives from health and social services, and senior officers from all the main authorities in the areas which are involved in the prevention and management of child abuse (i.e. both statutory and voluntary agencies such as the probation service, police and NSPCC which are concerned with the care of children and families). The main functions of the Committee suggested in the circular are listed below:

- (1) to establish a programme of work to develop and keep under review local joint policies and procedures, including:
  - (i) to establish and maintain interagency procedural guidelines;
  - (ii) to review significant issues arising from the handling of cases;
  - (iii) to review arrangements to provide expert advice;
  - (iv) to review progress on work to prevent child abuse.
- (2) to revise local handbooks so that they represent the comprehensive and up-to-date statement of local policy;
- (3) to review annually the work to protect children from harm in their area, and plan for the year ahead;
- (4) to provide education and training programmes to heighten awareness of the problem.

### **The child protection register**

A key feature of the approach to the problem of child abuse at a local

level is the establishment and maintenance of child protection registers (formerly child abuse registers) to record all cases of abuse and those in which a child is at risk of abuse.

Recent Government guidance on this subject<sup>12</sup> has indicated three broad objectives of such a register.

- (1) To provide a record of all children in the area who are currently the subject of an interagency protection plan and to ensure that the plans are formally reviewed at least every six months.
- (2) To provide a central point of speedy enquiry for professional staff who are worried about a child and want to know whether the child is the subject of an interagency protection plan.
- (3) To provide statistical information about current trends in the area.

A variety of local arrangements exist throughout the country for the maintenance of registers. The body responsible for housing the register may be the District Health Authority, the local authority social services department, or the NSPCC. In any case, a senior officer with experience in the child-abuse field (the 'custodian' of the register) takes overall charge of the register.

The categories of children to be registered would usually include:

- (a) Physical injury
- (b) Physical neglect
- (c) Failure to thrive and emotional abuse
- (d) Sexual abuse
- (e) Children in the same household as an abused child.

A child is placed on the register only after agreement between all the agencies concerned and an interagency agreement is made to work cooperatively to protect the child; usually this will be decided at case conference. Similarly, the removal of a child from the register is undertaken only with the agreement of all parties that formal interagency working is no longer necessary to protect the child, again often at an informal case conference. Other aspects of register maintenance include ensuring confidentiality, communication of changes of registered details, updating with additional reports and notification of details to another area if the family moves house.

## **Prevention**

As in other fields involving human behaviour successful preventive measures are very difficult to establish.

If better methods could be devised to identify families where violence is likely to occur then the necessary corrective measures could be taken. It has been suggested that this could begin in hospital obstetric

departments by making a concentrated effort to identify mothers who are at risk of maltreating their child. More frequent visiting to give support to isolated families may reduce the risk. As more attention is focused on the problem of child abuse various schemes are being established, such as self-help groups and the 'crying baby' 24-hour service, where health visitors respond to crises.

A more long-term measure is to develop the teaching of parenthood in schools, with emphasis on child development and the emotional needs of babies and children.

### **BATTERED WIVES**

In recent years, more attention has been paid to this subject. As with child abuse, the size of the problem is difficult to estimate and studies of risk factors are open to methodological criticism. Cautious interpretation of the data, however, suggests that both husbands and wives may themselves have come from a background of family violence and homes where parents were separated and divorced. There is evidence to suggest that marriage or cohabitation or both were entered into after only a short acquaintance. As many as 25% of girls may have been beaten before marriage and yet proceed with marriage, often because of pregnancy. There seems little doubt that alcohol is the principal exacerbating factor in episodes of violence.

The official source of advice most frequently sought by battered wives is the general practitioner, who may not find it easy to resolve the problem. However, it is a problem which frequently receives attention in the media and has been the subject of activity on a voluntary or self-help basis, e.g. through the setting up of hostels for battered women. In some parts of the country these initiatives have been taken or supported by statutory authorities. The passive role of health professionals towards the problem was criticized by a Select Committee of the House of Commons in 1975<sup>13</sup>.

### **SERVICES FOR CHILDREN**

#### **Origins**

Services exclusively dedicated to the welfare of children developed slowly and sporadically in Britain during the eighteenth century. A dispensary for children of the poor was established in London in 1769 and, as part of its service, children were visited at home. A hundred years later this feature was developed when a home-visiting service by 'respectable working women', to help and advise on child welfare matters, was established in Manchester and Salford. At the beginning of this century, a comprehensive health visiting service was established

in Huddersfield to combat the high infant mortality rate and a local Act made notification of birth to the Medical Officer of Health compulsory so that a home visit could be made shortly after the birth. This pioneering service was followed by national legislation which was, at first, permissive but later through the Notification of Birth Act 1915 made compulsory. A few years later, local authorities were empowered to make arrangements for safeguarding the health of mothers and children, including the provision of free antenatal and post-natal clinics. Child Welfare Clinics provided by local authorities became more numerous and a national scheme for training health visitors was inaugurated. Universal compulsory education introduced by the Education Acts of 1870 and 1880 revealed the extent of poor hygiene, malnutrition and handicapping conditions amongst school children. Further legislation was soon passed to give power to local authorities to make provision for blind, deaf, defective and epileptic children. The first full-time School Medical Officer was appointed in London in 1890 and other places followed suit. However, it was the disquiet about the nation's health following the discovery of the poor physical condition of recruits for the Boer War which clinched the matter. Medical inspection of school children was made compulsory in 1907. As there was no national health service, it was soon realized that provision had to be made for treatment of school children and this arrangement continued until the NHS was established in 1948.

In the eighteenth and nineteenth centuries young children were often admitted to the women's hospital wards, usually accompanied by their mothers who helped to care for them in hospital. In 1852, the Hospital for Sick Children in Great Ormond Street, London was opened and shortly afterwards many other children's hospitals were built. A register for sick children's nurses was established in 1919, and the emerging new specialty of paediatrics assumed increasing importance during the late 1920s and early 1930s.

### **Services for pre-school children**

Treatment of sick children is undertaken by general practitioners and hospital doctors. Since the beginning of the century, the preventive branch of the Child Health Services has been staffed largely by community-health personnel, based in child health clinics.

Virtually all health authorities continue to provide services based on such clinics, involving clinic doctors, health visitors, clinic nurses and sometimes voluntary helpers in offering advice and support to mothers in the care of their children, as well as on their own health. Many clinics also provide developmental assessment (in some form), advice on infant feeding, health education and immunization. Purpose-built premises are often used but in many parts of the country, clinics are

held in rented accommodation, traditionally church or village halls. Clinics operate on a three-hour session usually in the afternoon, and encourage a 'club-like' atmosphere. Milk tokens and vitamin preparations can be supplied free of charge to certain groups of people or at reduced rates. Undoubtedly, this service played an important part in the improvement of children's health, but nowadays there seem to be good reasons for locating the service in general practice provided that the general practitioner is knowledgeable about the approach and techniques of preventive child health and has sufficient support to ensure that all the children in the practice are covered.

The present service overlaps with the work of general practitioners, particularly in relation to immunization and in some studies up to half the children attending infant welfare clinics were referred for treatment to their general practitioners. However, the greatest concern of the service, whether in clinics or run by general practices, should be the non-attender. In a survey in Teesside in the 1970s<sup>14</sup>, 16% of mothers under the age of 24 years (50% of whom belonged to Social Classes IV/V) with children under the age of 3 years had never attended a clinic. In some parts of the country schemes have been initiated to improve availability and accessibility of clinic services, such as evening and weekend opening, which may benefit working families.

### *Infant feeding*

During this century fashions in infant feeding have changed, although medical authorities continued to recommend breast-feeding with varying amounts of enthusiasm.

A report by a government-sponsored working party on infant feeding in 1980 recommended that all mothers should be encouraged to breast feed their infants for longer than 3 months, provided the baby continues to thrive. Beyond that it considered that even after introduction of a mixed diet, the mother could continue breast feeding for as long as she wished. If artificial feeding is adopted, it recommends the use of an approved infant formula which, when reconstituted, is comparable in respect of most nutrients with average mature human milk<sup>16</sup>. The report suggested a flexible approach to mixed feeding but suggested that few infants need food other than milk before 3 months of age and that by 6–8 months nearly all babies required mixed feeding. It also recommended that sugar or salt should not be added to the solid foods in an infant's diet and that adequate vitamin supplements should be maintained, preferably to the age of 5 years. The special needs of low birth weight and Asian children (in respect of vitamin D) were emphasized.

### *Developmental paediatrics*

*Developmental paediatrics* is concerned with the maturation process in babies and young children. Today, the subject usually encompasses the measurement of skills in the use of special senses (visual and auditory), the detection of gross and fine motor movements, the assessment of language and intellectual achievements, and the appraisal of emotional and social capacity.

*Developmental screening* has a more limited aim which is to detect deviations from the normal range of skills and abilities quickly and early, but does not purport to make a definitive diagnosis.

*Developmental assessment* aims to establish a diagnosis and also devise a plan to deal with the problem.

During the last 20 years, a number of programmes for developmental screening have been introduced which, although broadly similar, show variations in their scope and refinement. A report of the committee on Child Health Services (Court Report)<sup>15</sup> recognized the limitations of developmental screening and recommended a broader programme of health surveillance which would include social and emotional development.

### *Health surveillance*

The programme of health surveillance recommended in the report for pre-school children can be summarized as follows:

- (1) *At birth* – an immediate examination to identify obvious disorders by an obstetrician, paediatrician or general practitioner, depending on the place of delivery.
- (2) *Between 6 and 10 days* – a full examination by a doctor with training in neonatal paediatrics with the results recorded in a form which would provide the start of an on-going child health record.
- (3) *Six weeks* – an introductory visit to ‘clinic’ premises where advice can be given on management and family problems.
- (4) *Seven to eight months* – review of development, especially hearing and vision. The timing of this contact is important; six months is not a rewarding age to check motor development, while 9–10 months is often too late for the first routine hearing test. This review should be carried out by a child health visitor\* at a clinic or at home.
- (5) *Eighteen months* – review of development of mobility, manipulative skills, hearing, early language, social relationships and milestones in growth and behaviour. This review should be

- carried out by the child health visitor\* at a clinic or at home.
- (6) *Two-and-a-half to three years* – review of development of behaviour, language and an opportunity to test vision and cover test for squint. This review should be carried out by a general practitioner paediatrician\* or the child health physician\*.
  - (7) *Four-and-a-half to five years* – a comprehensive medical assessment summing up the early health and development of the child in relation to entry to school, so teachers may have an early warning of, e.g. speech or behavioural difficulties which could affect the child's performance at school. Included in the assessment should be tests for vision, squint and hearing. This examination should be carried out by the general practitioner paediatrician\* or child health physician\* acting as school doctor. The examination should be carried out immediately prior to school entry or just after starting.

The programme set out by the Court Report has been described in some detail because, to a great extent, it represents the ideal situation. The difficulty of implementing it in view of the manpower implications have meant that in some places a modified version of the scheme is in operation. Most include early neonatal examinations which are regarded as essential, and the full examination just before, or shortly after, starting school. Examinations at other time periods vary according to local arrangements.

Another approach which has been put forward is that a developmental check should be made on children each time they make contact with their general practitioner.

### *Milestones in childhood*

- Sitting (1 minute): 4½–9½ months
- Walking (10 steps): 9½–18½ months
- Words (3 or 4): 8½–20 months
- Sentences (3 or 4 words): 16–36 months

*Evaluation.* Although developmental screening is widely practised in Britain, many remain unconvinced of its value. They criticize both its heavy demands on manpower and the fact that those who most need the service are least likely to receive it. In spite of this, there have been few attempts to evaluate the service. There is broad agreement about detection rates in various screening programmes.

Typically about 2% of infants are discovered to have handicapping

\*The Committee recommended the creation of these new posts which required extra training of doctors and nurses, but the recommendations were not implemented.

conditions while a further 7% have delay in development, and in the latter group eight out of ten will catch up and be within normal range within about 2 years.

Late language development found in about 7% of 3-year-olds decreases to about 1% by the age of 5. Amongst this group will be some mentally retarded children. Furthermore, even in localities where there is an active developmental screening service some 10–20% of children entering school have defects which should have been discovered. In spite of reservations made about some of the screening procedures this should in no way diminish the great importance of the early application of screening tests for vision and hearing. It is essential in these conditions to establish early treatment.

### *Registers of handicapped children*

Registers were introduced to monitor children with potentially handicapping conditions in the early 1960s, following the thalidomide tragedy.

The registers maintained by community health services, developed in different ways, but initially the main approach was to establish 'risk' registers. These contained information on births with risk factors such as toxæmia in pregnancy, difficult delivery and low birth weight. The criteria for admission to the register were often ill-defined, hence these registers also contained a substantial proportion of the child population so that surveillance became an impossible task with limited resources. Many had the names of up to 60% of the child population. Even worse, it was found that when handicapping conditions became overt almost as many came from the population that was not on the register as those who were registered.

Thus it became apparent that one of the original aims, to select children from the population who were likely to develop handicapping conditions thus avoiding the need to screen the entire child population, could not be achieved. Furthermore, the keeping of registers is a time consuming and complex exercise, requiring constant updating. The central problem is to find definitive factors which are good predictors of subsequent handicap.

The work of the national Child Development Study provided a greater understanding of these factors. The study followed up the events in the life of a cohort of children born in 1958. It was found retrospectively that a few easily defined criteria could have been used to identify 13% of the cohort, which accounted for 25% of the children who subsequently developed severe physical, mental or multiple handicap. Some authorities have used or modified these factors to provide a classification of a group of children who require extra surveillance. The criteria used include difficult births, gestation less



than 37 weeks, birth weight less than 2000 grams, large families in Social Class V and one-parent families.

However, even with the more scientific approach most health authorities have abandoned risk registers and adopted a policy that such registers should not be a substitute for surveillance of the whole child population.

On the other hand, many health authorities maintain an observation register containing the names of children with handicapping or potentially handicapping conditions who are then kept under special surveillance. These registers, with a much more restricted purpose, are regarded as essential by many community health workers.

### **Day care of children**

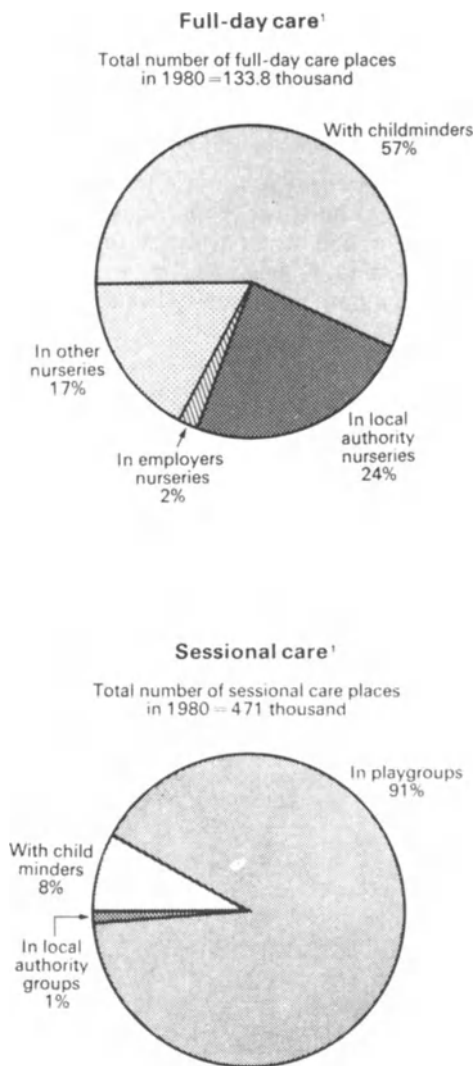
Arrangements for day care of children under school age are both formal and informal and broadly encompass: nurseries and nursery schools, playgroups and childminding. The purpose of these schemes is either to allow mothers to go out to work or to give some respite from the heavy burden of looking after young children.

Figure 6.9 shows the availability of full- and part-time day places in Britain in 1980. The 134000 full-time places represents 41 per 1000 children under the age of 5 years, an increase on the corresponding figure of 27 in 1972. The majority of children are cared for by informal arrangements with relatives, friends and neighbours, although there is no reliable estimate for this and it is not shown in the figure. Of the modes of care for which data are available, the largest proportion of full-time care is provided by registered childminders and most part-time care is provided in playgroups.

#### *Day nurseries*

Day nurseries are provided by social services departments of local authorities for children of pre-school age. They usually have between 30 and 60 places and are open from Monday to Friday from about 7 a.m. to 6 p.m. Charges are made in accordance with the parents' income. Most of the staff have a Nursery Nurse qualification and health visitors have a responsibility to ensure that adequate measures are being taken to prevent the spread of infection. Many nurseries have teachers available to advise and help with the children's educational needs.

Most social services departments assign priorities in deciding how to allocate places in day nurseries. Such categories might include: children of one-parent families, children at risk of non-accidental injury, children of families where mother or family are under particular stress, children whose home circumstances are poor and handicapped children.



**Figure 6.9** Day care for children under five: places available in Great Britain in 1980. Source: Central Statistical Office (1981). *Social Trends*, No. 12 (London: HMSO) <sup>1</sup>In Scotland all children cared for by childminders are counted as full-day care.

The provision of places in day nurseries varies considerably in different parts of Britain. Greater provision is usually found in places where there is a tradition of female employment, but in other places provision may be low or non-existent.

*Private nurseries.* These are provided by individuals or organizations for profit. They are run on the same general lines as day nurseries. The purpose and clientele varies with the locality. Local authority social services departments are responsible for the registration and supervision of private nurseries under the provision of the Nursery and Childminders Regulations Act, 1948 as amended by the Health Service and Public Health Act, 1968.

*Nurseries at places of work or study.* A small proportion of full-time day care (2%) is provided in day nurseries by employers such as industrial firms, hospitals, universities and colleges, and is established at or near the site of work. The organizations concerned subsidize the schemes and charges vary. They are popular because mothers are nearby and able to see their children during the day. They tend to be cheaper than local authority day nurseries and the hours match the working hours. The disadvantages of such schemes, however, are that travel to work with young children on public transport can be difficult and it makes changing jobs less straightforward. Local social services departments are responsible for registration and supervision.

#### *Nursery schools*

The nursery school has a different orientation to the day nursery. It is the responsibility of the education department rather than the social services department, although close links exist between the two. Its aim is to provide part-time education for children between 3 and 5 years of age.

#### *Childminders*

In accordance with the legislation already mentioned a childminder is defined as a person who looks after one or more children under the age of five years (to whom they are not related) in their own home for two hours or more per day for which they receive a fee or reward. Local authority social services departments are responsible for maintaining a register of childminders and their premises. Before registration they must be satisfied that the person is fit to act in this capacity and that the premises are suitable. An upper limit of number of children to be cared for is also fixed and conditions set out concerning safety. Some local authorities employ childminders on a salaried basis.

The number of places offered by registered childminders increased

from 14000 to 87000 during the period 1961-1974, although part of this must be accounted for by previously unregistered childminders becoming registered.

Childminding is popular with many working mothers because it provides them with flexibility. It has the potential advantage, for the child, of allowing continuity of care in a personalized and family environment.

### *Playgroups*

Playgroups started as a self-help movement in the early 1960s. Children usually attend for a 2½ hour session and a fee is charged towards the cost. Some local authorities have established their own playgroup schemes and others give support to voluntary schemes or subsidize places for children with special needs.

Registration and supervision of play groups is the responsibility of social services departments under the same legislation which covers private nurseries and childminding. In registering playgroups and private nurseries, the local authority may make requirements concerning adequacy of equipment, arrangements for feeding, and fitness and qualifications of people responsible for the care of the children. Playgroups which are run on a voluntary basis for less than two hours need not register.

There has been a great increase in the provision of playgroups and by 1980 there were over 400000 places in Britain.

### *Family day-care centres*

These centres have been established recently in a few places by social services departments, often in association with voluntary organizations. They provide a wide range of day-care needs. Often located in day nurseries, they are envisaged as a focal point for the various elements in day care. The staff provide a resource for families and their children and are a base for social workers and volunteers, childminders and playgroup leaders. They can provide training for childminders, playgroup and private nursing staff. Some also have toy libraries and provide subsidized food.

### *Special schemes*

Some voluntary organizations operate special schemes to provide help in the home, especially to those who are deprived or for a variety of reasons are experiencing difficulties with their pre-school children. In such schemes, a volunteer, who is herself an experienced mother, shares her time and skills in helping the mother in need to develop sufficient self-confidence and understanding to cope with children on her own.

### *Over-fives*

There are a few schemes for the day care of over-fives. In some places, where parents are at work, children are cared for in school premises after school hours instead of going home to an empty house. In general these schemes have not been too successful, partly because of the pejorative reference to the children as 'latch-key children' and because parents often prefer to make arrangements with neighbours.

School premises are also used in the school holidays to provide activities for children and in these schemes volunteers play a major part. Holiday schemes for children who are unlikely otherwise to get away are provided by local authorities, usually in conjunction with voluntary organizations.

### **The school health service**

An important landmark, the school health service on a national scale, arose largely because of recommendations published in 1904 by the Interdepartmental Committee on Physical Deterioration, following the discovery of high levels of unfitness amongst recruits for the Boer War. The Education Act 1907 placed a duty on local authorities to arrange systematic medical inspections of schoolchildren. In the days before a national health service, the discovery of defects without arrangements for treatment was unhelpful so that eventually (through the Education Act 1921) local authorities also provided treatment. This additional measure particularly benefited children of poor parents. For example, authorities made provision for the treatment of minor ailments, the supply of spectacles, dental treatment and underwrote payments for minor operations like tonsillectomy. When the NHS came into operation in 1948, treatment became the responsibility of the general practitioner and hospital services. The school dental service, however, still continued to provide treatment.

At this time, the school health service was the responsibility of local education authorities and in a great majority of cases Medical Officers of Health were also Principal School Medical Officers. In 1974, the school medical service became part of the NHS and the responsibilities and functions of the Principal School Medical Officers were assumed by specialists in community medicine.

### *Range of functions*

The broad objectives of the School Health Service are to supervise the growth and development of schoolchildren and to identify those with physical or mental defects and with other specific disorders which may affect their learning capacity. As well as medical examination of schoolchildren, the service provides screening procedures, ensures that immunity levels are maintained and promotes health education

programmes. Staff also act in a supervisory and advisory role for handicapped children and their parents and provide a consultation service for adolescents. The main emphasis of the service is prevention but in that dentistry, speech therapy, physiotherapy and chiropody are included, treatment is therefore also provided. The school health service works closely with parents, teachers, general practitioners and hospital consultants.

### *School medical inspections*

An important part of the work of the service is the medical examination of children, especially on entering school, to detect abnormalities and initiate treatment where appropriate. The main responsibility for this lies with a corps of doctors and nurses.

About 5000 clinical medical officers work in this service in England, but because many are part-time, they represent only 2000 whole-time equivalents. Most are paid a salary but, increasingly, general practitioners fulfil this role on a sessional basis. No special training is given to doctors working in the school health service, although authorization is necessary before assessments of educationally subnormal children are made. This is released only after the doctor in question has attended an approved course and worked under supervision for a period of six months. Other short courses for clinical medical officers are available on various aspects of the school health service.

About 10000 nurses work in the school health service, about half of whom have a Health Visitor's Certificate. Nearly all the health visitors undertake this work in addition to their other duties. In order to give a more personal and efficient service, many schools have a named doctor and nurse who regularly visit the school and are available for consultation and advice.

*Frequency of medical examination.* Routine medical inspections of children were, for many years, carried out on three occasions: at school entry, before entering secondary school (about 10 years of age) and before leaving school (about 14 years). It became apparent that medical examination at this frequency of the entire school population was not justified and that attention should be concentrated on those children who most need help. Schemes of selective medical examination have been introduced involving only children referred by parents, teachers or a school nurse. The practical difficulty of such schemes is that the large number of referrals which have occurred have been counter-productive. At present, the frequency of medical inspection is a local decision and whilst there seems to be general agreement that medical examination is essential at school entry, thereafter there is wide variation between different authorities.

There have been few studies on the school health service but these have highlighted weaknesses in both routine and selective systems of medical examination. What is needed is to find a better way of identifying the small number of children who need help and concentrating effort on them. One way might be to concentrate on schools in poorer areas.

*Procedure for medical inspection.* Details of a child's medical and family background are usually obtained from parents by a questionnaire administered at the time of school entry. Infant welfare records of previous medical history, the results of developmental screening and immunization status are also reviewed at this stage. Measurements of height, weight and tests of vision, hearing and speech are carried out by the school nurse and the source of information about performance and behaviour at school is the teaching staff. It is against this background that, in consultation with the nurses, teacher and parents, the school medical officer carries out a general physical examination. Other routine medical examinations when the child is older are organized in a similar manner. Defects that are discovered which are amenable to treatment are dealt with through the child's general practitioner.

Virtually all school medical examinations take place in the school itself. New schools have purpose-built medical rooms, but they are frequently used for other purposes when medical examinations are not in progress. Unfortunately, many schools have no such room and some less satisfactory place is used, such as the head teacher's room, a gymnasium or assembly hall.

The school day is relatively short and the time for medical examinations is further reduced by morning assembly, lunch, mid-morning and mid-afternoon breaks so that little more than two hours are available for a morning or afternoon session. During this time the doctor may examine between 12 and 20 children, so that inevitably consultation time is short. The main objective of these examinations is to identify defects which may have an adverse effect on the child's education and to ensure that early treatment is established. In practice, therefore, more time is spent with children with such problems.

Attendance by parents at medical examination on entry to school is high, but is much less frequent in the case of older children.

*Findings of medical inspections.* A standard record card is used nationally for school medicals and sets out a check list of items to be marked off indicating where there is no defect; a defect requiring observation, treatment, reference to a specialist or a GP; or a permanent defect requiring no action. In the late 1970s in England and

Wales approximately 16% of school entrants had defects which required treatment including visual (5%), ears (2%), nose and throat (2%), skeletal (2%). However, up to 50% of children with these defects were not receiving treatment.

*Surveillance.* Most surveillance of the health of schoolchildren is the responsibility of the school nurse. At set intervals she carries out tests for vision and hearing, as well as monitoring height, weight and hygiene (particularly head infestation). She also seeks to ensure that immunization schedules are adhered to.

#### *The school dental service*

There are approximately 2000 dental officers and about 3000 dental attendants and technicians in the school dental service. Their major function is preventive dentistry through regular inspection, but they are also expected to provide dental treatment for schoolchildren and expectant mothers. They are responsible for about a fifth of all dental treatment of children of school age.

#### *Minor ailment clinics*

Although the role of the school health service in treatment ceased after the introduction of the NHS, minor ailment clinics have continued to flourish in some areas. Most of the work in these clinics is done by nurses. First-aid treatment is given for minor injuries and accidents, treatment of skin infections, conjunctivitis and similar conditions, thus saving a visit to a general practitioner or hospital with consequent loss of time from school.

#### *Specialist clinics*

Some authorities still find it more convenient for hospital consultants such as ophthalmologists and otorhinolaryngologists to hold sessions in school health service clinics for children who are referred with visual, or ear, nose and throat problems following routine inspection and surveillance. However, in recent years there has been a tendency to provide this diagnostic and treatment service in hospital.

#### *Child guidance clinics*

Children with behavioural problems which cannot be dealt with by their teachers and school medical officers make up part of the work of the child guidance service. There are about 500 child guidance clinics in England and Wales, staffed by child psychiatrists, educational psychologists and social workers. Play therapists are sometimes members of the child guidance team and help can also be given on a part-time basis by speech therapists. In some districts, health visitors are also involved.



The team in the clinic arrive at a diagnosis and decide on a treatment plan in close association with the school staff. Thus, management in child psychiatry has become much more diverse and often has a strong family orientation.

Children can also be referred to the service by general practitioners, the Courts, or by parents directly.

### *Employment of children*

Children over 14 years may be employed on a part-time basis. Local education authorities have powers to supervise such children who are under school age and in employment. It is a requirement that they should be medically examined to ensure fitness. Education authorities can prohibit or impose restrictions on employment if it is thought unsuitable. The hours of employment are limited and must be outside school time.

### *Handicapped children in school*

The Education Act 1981 required major changes in the way in which the educational needs of handicapped children were to be met. The Act incorporated recommendations of a report of the Committee of Inquiry into the Education of Handicapped Children and Young People under the chairmanship of Mary Warnock<sup>17</sup>.

Prior to this Act, handicapped pupils were legally defined in accordance with specified categories such as: blind, partially sighted, deaf, partially deaf, educationally sub-normal, epileptic, physically handicapped, delicate and those with severe speech defects. This had been criticized because it was difficult to make a precise legal definition for many of the handicapping conditions of childhood. In addition, legal categorization meant that special schools and units had evolved which restricted their intake to defined categories. However, the approach was useful in the years following World War II, because it helped to ensure that local education authorities ascertained the needs of and made provision for different groups of handicapped children.

The Warnock Committee recommended the abolition of the distinction between handicapped and non-handicapped children and its replacement by a unified approach to the education of all children with learning difficulties. It is estimated that up to one in five children require some form of special provision at some time during their school career. Within this large group are a minority of children who require special arrangements because of severe, complex and long-term disabilities. The 1981 Act provides a legal framework to make this possible. It places an obligation on local education authorities to ensure that adequate provision is made for all children with special educational needs. Within their scope are children under 5 years and,

with the agreement or at the request of parents, assessment and special education provisions can be made for children under 2 years.

This new approach embodied in the Act focusses on the child, not the disability. The extent to which a disability may hinder a child's educational development depends not only on the type and severity of the handicap but also on personal attributes such as intelligence, motivation and social adjustment as well as the nature of the home and school environment. The educational needs of an individual child thus derive from the interaction of his ability, his disability and his environment.

### *Assessment*

The Warnock Committee recommended assessment in stages. It would be impracticable and unnecessary to offer the full process of assessment for up to one in five of the school population. The Committee recommended that the first stages of assessment should be carried out within the school. In this way, arrangements may often be made within it to meet the child's special educational needs. It may be necessary, however, for a minority of children to be referred for multi-professional assessment if they require additional, specialized help from agencies outside the school. The Act lays down specific procedures for the assessment of children under these circumstances. In addition to the formal assessment initiated from school it may also follow requests from parents or from other sources such as child guidance service and school health staff.

Emphasis is placed on carrying out assessments as sensitively as possible. Parents must be involved in the procedures and they should be given the name of the local educational authority officer from whom they can obtain further information. The local educational authority is responsible for making assessments and must always obtain educational, medical and psychological advice. Other professionals (e.g. social workers and nurses), can also be included where relevant.

On the basis of advice from professionals in the Education, Health and Social Services the local education authority compiles a formal statement on an individual child as prescribed by regulations under the 1981 Act. The statement concerning the child's special educational needs must also include the views of the parents and specify the special education provisions to be made. The statement is first prepared in draft form to allow parents to comment and make representations and, as a last resort, they retain the right of appeal to a Special Appeals Committee.

The basic aim of this new legislation is to allow handicapped children to be catered for wherever possible within ordinary schools (possibly

special classes). This integrative approach to the education of children with handicapping conditions is thought to be the best preparation for adult life.

## **CHILDREN IN CARE AND IN COURTS**

### **Definition of care**

A considerable proportion of the work of the social services departments is directed towards helping children and their families. Social workers provide support and assistance, for example, by encouraging children to attend playgroups, or mothers with children to take part in recreational facilities. All these activities could be regarded as 'care'. In the context of children's work, however, 'care' has a more limited meaning; it implies care outside the family in a children's home or foster home. There are no specific statutory controls over arrangements by parents to look after their children in their own home by an au pair, relative or any other person. The purpose of local authority care is to protect the child. Children can be admitted to care with the agreement of their parents (voluntary care) or in certain circumstances, through the courts (statutory care). In the latter case, the parents may have withheld their consent.

### **Legislation**

Because of the vulnerability of children through exploitation, neglect and cruelty, legislation has been available for many years to protect them. The legislative framework is complex so that only its broad aspects are considered in this section. Many of the Acts cannot be considered in isolation and some of the recent enactments have not yet been fully implemented because of the cost involved.

Most of the work involved falls locally on social service departments and juvenile courts. The central government department chiefly involved is the DHSS.

### **Preventive services**

The Child Care Act 1980 places a statutory duty on local authority social services departments to diminish the need for children being received into care or being brought before the courts. Individual local authorities have placed different interpretations on their legal powers. Preventive measures such as the provision of clubs and family rehabilitation units have been established, sometimes in association with voluntary organizations. In general, help and advice is given to the family, the help usually in kind rather than in cash. Cash payments in exceptional circumstances are made for such things as rent, rates and

overdue bills on the grounds that it is cheaper than taking children into care.

**Voluntary care**

Under Section 2 of the Child Care Act 1980, the local authority has a duty, when it is in the interest of the welfare of the child, to receive into care a child under the age of 17 if:

- (1) He has no parents or guardian.
- (2) He has been and remains abandoned by his parents or guardian.
- (3) He is lost.
- (4) Parents or guardians are temporarily or permanently prevented by reason of mental or physical illness or any other circumstances from providing for his proper accommodation, maintenance or upbringing.

In this voluntary form of care the local authority has no right to keep the child if the parents wish to take him home.

The majority of children are admitted for periods of less than 6 weeks and in a very large proportion of cases the reason for admission is illness in the family or confinement of the mother. This form of admission is intended as a short-term expediency to deal with a family crisis. Families using it are usually poor, with bad housing and unstable family relationships.

**Children and the courts**

The Children and Young Persons Act 1969 embodied many of the points from a White Paper 'Children in Trouble' (1968) and marked a radical change of approach. Broadly it viewed the child at risk of being injured, the child who is being neglected, the child already in care and the young offender as potentially needing access to the same sort of help and support. Implicit is the assumption that such problems arise from circumstances, and a rejection of the notion that there are children who are intrinsically either good or bad. The view also was that most problems could be prevented. The importance of the family was recognized and the intention was that weaknesses should be supported by society, and that care proceedings should take precedence over criminal proceedings, although it was assumed that in either case a detailed investigation must take place. There was a general acceptance that courts and Borstals were not the best way of dealing with difficult children. The remedial and non-custodial aspects of child care were further emphasized by the transfer of responsibility for children from the Home Office to the DHSS following the passing of the 1969 Act.

### *Juvenile Courts*

The Juvenile Court system was initially established under the Children Act 1908. Changes and modifications have occurred and continue to be made. A child under ten years cannot be charged with an offence. Juvenile courts deal with children (aged 10–14 years) and young people (aged 14–17 years) who have committed offences (except homicide), are in need of care, protection or control, or who have truanted from school. Proceedings are confidential: the public are not admitted and only in exceptional circumstances are names published in the Press. Courts have a maximum of three magistrates with both sexes represented and are held in places other than the usual courtroom. The atmosphere is informal.

### **Statutory care**

#### *Committal to care by the courts*

It is sometimes necessary for local authorities to obtain a Court Order under Section 1 of the Children and Young Persons Act 1969 for the admission of a child to care. This action is taken only after a detailed investigation of the home environment, school performance and character of the people involved, and if necessary medical and psychiatric reports. The Juvenile Court must satisfy itself that the child is in need of care or control and is unlikely to receive it unless an order is made. In addition at least one of the following six conditions must apply:

- (1) The child's proper development is being avoidably prevented or neglected, or his health is being avoidably impaired or neglected or he is being ill-treated.
- (2) The court is satisfied that another child of the same household is being treated as in (1); then they will probably be satisfied that this condition applies to the child in question.
- (3) The child is exposed to moral danger.
- (4) The child is beyond the control of his parent or guardian.
- (5) The child is of compulsory school age and is not receiving efficient full-time education.
- (6) The child is guilty of an offence (excluding homicide).

If the court is satisfied that one of these conditions is present, then it may make one of the following orders:

- (a) A care order, which commits the child to the care of the local authority who take responsibility for him.
- (b) A supervision order which puts the child under the supervision of the local authority or sometimes a probation officer. The supervisor's function is to 'advise', 'assist' and 'befriend'.

- (c) An order requiring the child's parents or guardian to enter into a recognition to take proper care and control over him.
- (d) A hospital or guardianship order under the Mental Health Act 1959.

The Court also has the power under other Acts where the circumstances are exceptional to commit a child into local authority care when the proceedings involved are: wardship, divorce, matrimonial or custodial disputes.

Care proceedings may be brought by a local authority, the police or the National Society for the Prevention of Cruelty to Children. However, only a local educational authority can bring proceedings concerning school attendance and only the local authority or the police in circumstances where an offence has been committed. Parents or guardians may ask that the local authority institutes care proceedings if the child is beyond their control. If a local authority fails to take action within 28 days, the parent may then apply to a Juvenile Court which can order the authority to comply with the parents' request. A child over the age of 16 who is, or has been, married, cannot be the subject of care proceedings.

In cases of urgency, under certain specified conditions, the court has powers to remove a child immediately, e.g. if he is being ill-treated and neglected or assaulted, and put him in a 'place of safety' (a community home or hostel, for example). Care proceedings are then brought within 28 days. A care order remains in force until the child reaches the age of 18 years (19 years if the order is made when the child is 16 or over). The child or the authority may apply to the courts to have the order discharged – less than 15% do so.

### *Parental rights*

A care order granted by the courts transfers rights from the natural parents to the local authority. A local authority may also pass a resolution under Section 3 of the Child Care Act 1980 assuming parental rights of a child it has received into care. Circumstances in which parental rights may be assumed in this way include:

- (1) The parents are dead.
- (2) A parent has abandoned the child.
- (3) A parent suffers from permanent disability rendering him incapable of looking after the child.
- (4) A parent is unfit to have care of a child because of a mental disorder, mode of life, or consistently failing to discharge the obligations of a parent.

Parents, if they can be found, are notified and have a month to object.

This objection is dealt with by a Juvenile Court, and if unsuccessful, the resolution can remain in force until the child is 18. There are two exclusions to the powers of a local authority who hold such a resolution or have parental rights under a care order granted by the courts. It cannot agree either to adoption or a change of the child's religion. In the interests of the child, the local authority may decide to rescind a resolution or the parents may apply to a Juvenile Court for restitution of their rights. If the authority has not, in fact, assumed parental right, the parents may remove the child from care, but a period of care in excess of 6 months means that 28 days' notice is required. This measure allows time to prepare the child for return to his parents. The parent may be required to contribute towards the cost of maintaining the child until the age of 16.

In addition, Section 57, Children Act 1975 enables a local authority to pass a Section 3 Child Care Act resolution assuming parental rights and duties if the child has been in their care for three years.

### **Criminal proceedings**

If a child between 10 and 17 years commits an offence and this has not been dealt with under the care proceedings, then criminal proceedings may be taken. These are conducted by the Juvenile Court except in the case of homicide. As in care proceedings the Court takes into consideration information and reports. It does not pass sentence in the ordinary sense of the word, but can take one of the following actions:

- (1) Give an absolute or conditional discharge.
- (2) Bind over the offender.
- (3) Fine or order the payment of compensation.
- (4) Make an attendance order.
- (5) Make a care order.
- (6) Make a detention centre order (14 years and over).
- (7) Make a supervision order (these replaced probation orders for children under 17 years).
- (8) Send the offender for Borstal training (aged 15 years and over).
- (9) Make a hospital or guardianship order under the Mental Health Act, 1959.
- (10) Make an order requiring the child's parent or guardian to take proper care of, and exercise proper control over, him.

A child under 16 years cannot be sent to prison.

### ***Intermediate treatment***

This is a recent concept which provides an alternative to either completely removing the child from home or leaving him at home when there are some reservations. Intermediate treatment allows the child to

stay at home but under the supervision of a local authority social worker (or occasionally a probation officer). A supervision order may thus contain instructions about where a child should reside and concerning his attendance and participation in constructive activities which may bring him into contact with a more enriching environment.

*Detention centre orders.* This is a more severe option: detention centres have a strict discipline with emphasis on physical training and manual work. There is a 12-month period of supervision on discharge. Detention centre orders are usually for 3 months, with an average stay of 2 months.

*Borstal training.* This is the most severe action which can be taken on a juvenile and is imposed by a Crown Court on the recommendation of a Juvenile Court. Discipline is strict and training is tough. A medical and other reports are required concerning the suitability of the individual for Borstal training. Borstal training is usually made for 2 years with an average stay of about 9 months.

*Statistics for juvenile crime.* The more liberal approach introduced by the Children and Young Persons Act 1969 has been criticized by those who attribute the increase in juvenile crime to the changes in legislative procedure. There was a substantial increase in the number of young people found guilty of indictable offences between 1969 and 1974.

Magistrates and local authorities also have expressed concern about the lack of availability of suitable accommodation.

### **Residential care**

The Children and Young Persons Act 1969 provides for the setting up of an integrated system of residential care which is planned on a regional basis and is designed to cater for the range of needs of children who require care. These homes are known as 'community homes'. The community home in its present form came into existence in 1973 and brought together the separate systems of remand homes, approved schools, children's homes and hostels. The scheme also provides for the establishment, from central funds, of youth treatment centres which are intended for severely disturbed children. These centres are residential with educational and medical facilities.

### *Regional planning*

In England and Wales there are 12 Children's Regional Planning Committees which have responsibility within each region to ensure a sufficient number of homes of each type to meet the total needs of the constituent authorities. Regional Planning Committees do not manage



or provide any community homes or employ staff within them: this is the function of the local authorities or voluntary organizations. Voluntary organizations may join the scheme for community homes or may remain outside it, but if they participate, then they must conform to regulations governing the running of the home.

**Boarding out (Fostering)**

This is the most common method of provision for long-term care and is also extensively used for short-term care. More than 38000 children in England and Wales were boarded out in 1980. Foster-parents are carefully chosen by social workers and come from all sections of society, and may include relatives of the child. Payment is sufficient to cover the maintenance of the child but in special cases, where the foster-child is disturbed or handicapped, extra payment may be made.

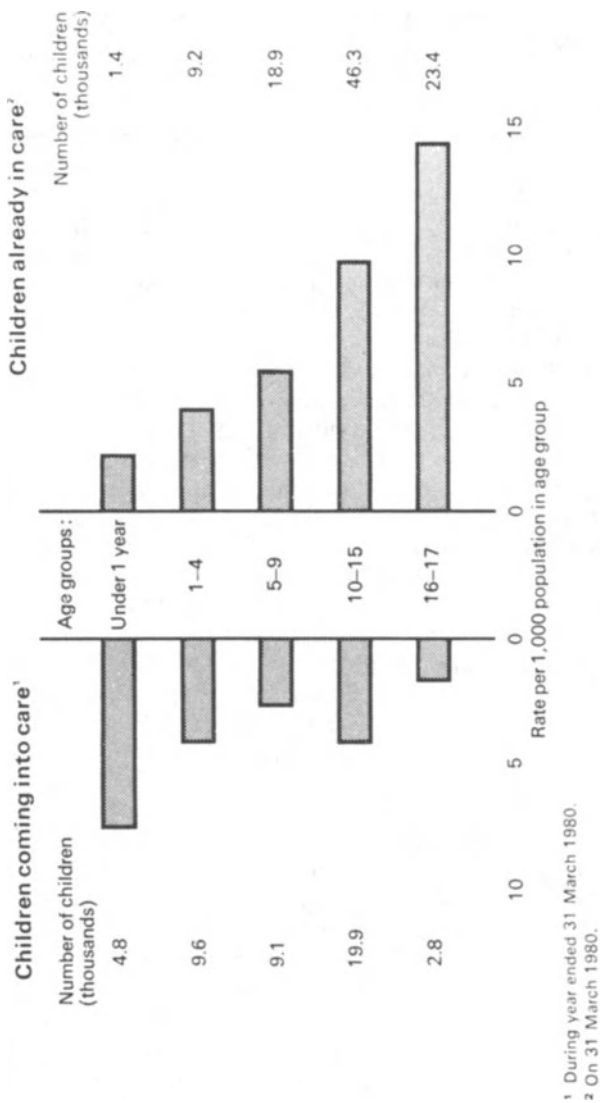
Foster-parents have no legal rights in respect of their fostered child. From time to time this has given rise to public concern when, for example, foster-children are taken away either by the natural parents or the local authority. The Children Act 1975 attempted to redress this problem by proposing a 'custodianship order' which gives foster-parents some parental rights, although this part of the Act is not in operation at the time of writing. Foster-parents may obtain full rights through adoption and, indeed, if the child has been with them for longer than 5 years, and an application to adopt is pending, the local authority is not legally permitted to remove the child.

**Statistics concerning children in care**

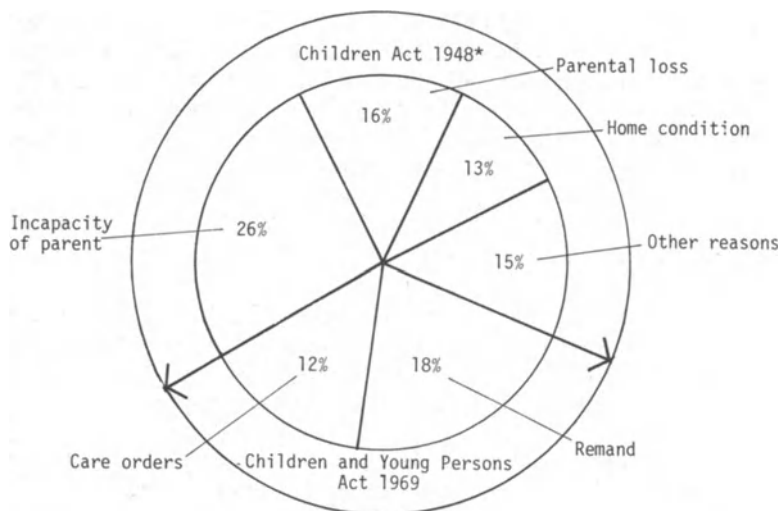
During the 1970s about 50000 children were admitted each year to care in England and Wales. The rates for admission to care vary throughout the country; the highest are in the inner city areas and the lowest in rural areas.

The majority of children coming into care in England and Wales in 1980 were aged between 10 and 15 years; 19900 (43%) out of a total of 46200 (Figure 6.10). The admission rate (per 1000 population) was highest for children under 1 year of age, but mainly because stays were shorter for this age group they represented only just over 1% of children in care. Of nearly 100000 children in care in England and Wales in March 1980, 70% were ten years or older; in terms of rates, the highest proportion of the population who were in care was amongst 16-17 year olds.

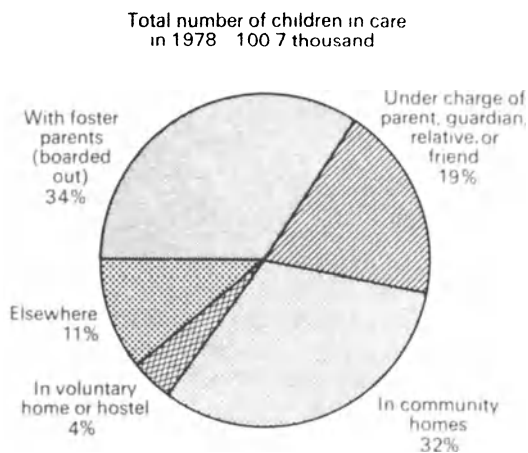
Figure 6.11 shows the reasons for admission of children to care in broad categories. Figure 6.12 shows where children in care have been placed by local authorities. Foster parents and community homes each account for about a third of the placements.



**Figure 6.10** Children in care or coming into care of local authorities in England and Wales by age, 1980. Source: Central Statistical Office (1981). *Social Trends*, No. 12. (London: HMSO)



**Figure 6.11** Reasons for admission to care of children during the year ending 31 March 1978, in England and Wales\*. Now consolidated in the Child Care Act 1980. Source: HMSO (1978). *Children in Care*. (London: HMSO)



**Figure 6.12** Placement of children in care in England and Wales, 1978. Source: Central Statistical Office (1980). *Social Trends*, No. 11. (London: HMSO)

**ADOPTION**

An Adoption Order is made by a Court and its effect is to make the relationship between the child and the adopters the same as if the child were their natural child. All parental rights are transferred from the natural parents to the adopters. Adoption orders are irrevocable except in unusual circumstances. If the adopter is a citizen of the United Kingdom, this citizenship is automatically acquired by the child.

*Who can be adopted?* A child for adoption must be under 18 years old and unmarried.

*Who can adopt?* The applicant for adoption must be aged 21 years or over and be domiciled in the UK. He must notify the local authority of his intention at least three months prior to the court hearing. This latter rule does not apply if one of the applicants is the parent or if the child is over 16 years.

An application to adopt a child is usually made by a married couple. It can be made by a single person and in exceptional circumstances one married person may adopt a child without the other spouse being involved. There are somewhat complicated arrangements for adoption by a step-parent, a divorced parent, or certain other relatives. In some of these cases, when the Children Act 1975 comes fully into effect, a custodianship order may be regarded by the courts as more suitable.

**Arrangements for adoption**

The Children Act 1975 placed a responsibility on local authority Social Services committees to provide an adoption service within their areas. In addition to the local authority adoption service a child may also be placed for adoption by:

- (1) A Registered Adoption Society.
- (2) The parent or guardian directly, but only to a relative.

The child must be in the care of the applicant for at least 3 consecutive months before the order is made. During the 3 months' probationary period the adopters have no parental rights and the natural parents may reclaim the child, although in practice this is rare. A mother cannot give consent for her child to be adopted until he is at least 6 weeks old.

**Court procedure**

Before a court makes an adoption order it has to be satisfied about the medical condition of the adopters and have the written agreement of the natural parents. The court has authority to dispense with parental agreement if, for example, the parents cannot be found or there is

evidence of neglect of the child. It also requires medical evidence of the state of the child's health.

The paramount issue before the court is the welfare of the child. To safeguard the child's interest, the court appoints a guardian *ad litem*. The nominated officer is the Director of Social Services but in practice one of his staff carries out this duty. He or she investigates all the circumstances and makes a detailed report to the Court with a recommendation as to whether the order should be granted or refused. Applications for adoption are held in private.

### **New proposals**

The Children Act 1975 proposed major changes in the law of adoption which are being implemented in stages. These include restricting the activity of a natural mother to reclaim her child when he has spent some considerable time with the adopters. The Act also requires voluntary organizations to function only with the approval of the Secretary of State for Social Services and restricts adoption arranged by individuals.

## **ONE-PARENT FAMILIES**

In Britain in 1981 about one in every eight families was a one-parent family – an estimated 900000 lone parents caring for one and a half million children.

It would be wrong to think of this sub-group of the population as uniformly disadvantaged. Many are at least as successful as two-parent families in terms of personal and social achievements and happiness.

It is also true, however, that a large proportion of one-parent families face additional problems. The most obvious of these relates to income. Many lone parents face the dilemma of whether to support their family solely on social security benefits or take up work and possibly have benefits reduced and gain little extra. The availability of benefits for lone parents is described in the next section. A report on one-parent families in 1974 (Finer Report)<sup>18</sup> recommended that there should be a guaranteed maintenance allowance for one-parent families which would allow the parent to choose whether to go to work or not. The recommendation was not accepted by the then Labour Government, mainly because of the cost involved.

The Finer Committee defined a one-parent family as “a father or mother living without a spouse (and not cohabiting) with his or her never married dependent child or children aged either below 16 or 16–19 and undergoing full-time education”. According to the definition, therefore, the family must have dependent children. Cohabitation places them outside the definition of one-parent families.

The increase in the estimated number of one-parent families from under 600000 in 1971 to 900000 in 1981 is largely accounted for by the increase in divorce and to a lesser extent by a rise in the number of single women with families. As Table 6.17 shows, more than half the estimated number of one-parent families in 1981 were headed by a divorced or separated mother. A higher proportion of single-parent families is found in inner-city areas of Britain. For example, it is estimated to be as high as one in three families in parts of inner-London.

**Table 6.17 One parent families by type estimated for 1981 in Britain**

<i>Family type</i>	<i>No. (thousands)</i>	<i>Percentage</i>
Lone fathers	100	11
Lone mothers:		
single	170	19
widowed	150	17
divorced	300	33
separated	180	20
All types	900	100

## **FAMILY SUPPORT**

The term 'family support' usually applies to financial assistance provided by central and local government for families with dependent children and adults. It encompasses also the relief or reduction of charges administered by the NHS and local authorities, as well as non-cash items such as free school meals.

Many other developed countries have family-support schemes. However, international differences in the level of support are complex to interpret. Some countries have benefit systems which favour large families, others discriminate in favour of lone parents. A detailed study of the social-support schemes in nine member states of the European community examined family and tax allowances as well as support provided through education and housing schemes. These various aspects of family support in the nine countries were compared in rank order of provision at different income levels and family types. The UK was fairly consistently in the middle of most of these 'league tables', being relatively more generous to smaller families and to those at lower income levels.

*Maternity benefits*

There are three maternity benefits.

*Maternity expenses payment.* This is a tax-free lump sum payment which replaced the maternity grant in April 1987. This is means-tested and payable only if the mother or her partner is getting income support or family credit on the date of the claim. The amount of the payment in April 1988 was £85 for each child including a stillborn child.

*Statutory maternity pay.* This is payable to a mother for a maximum period of 18 weeks, beginning not earlier than 11 weeks or later than 6 weeks before the baby is expected. The mother can choose when to claim. It is paid by the employer and the mother is eligible only if she has earned enough to pay Class I National Insurance contributions and has worked for the employer for at least 6 months up to the 26th week of the pregnancy.

*Maternity allowance.* This is payable to a mother for 18 weeks, starting 11 weeks before the baby is expected, but only for the days when the mother is not working. A mother is only eligible if she cannot get statutory maternity pay, has satisfied contribution conditions and has a recent record of employment.

*Guardian's allowance*

This benefit is payable to people who have taken the responsibility for an orphan, and normally both parents must be dead. It is payable in addition to child benefit and is tax free. It applies to only a small number of cases – about 2400 families for about 2900 children in 1986.

*Family credit*

Family credit, which replaced Family Income Supplement in April 1988, is a means-tested benefit for working families. To qualify for family credit, the family must have at least one dependent child. The head of the family or their partner must be in full time work (defined as a minimum of 24 hours a week). The maximum credit for a family is worked out according to family size and age of the children. If the claimant's income does not exceed a fixed level, known as the 'applicable amount' the credit is payable in full. Where the family's income exceeds the 'applicable amount', the family credit payable is reduced by 70% of the excess of income. Child benefit and one-parent benefit are disregarded in calculating the amount of credit payable. Once the award for family credit has been made it is not usually altered for 6 months, even though the family's circumstances may change.

*Other support for low-income families*

Housing benefits are available from local housing authorities for families receiving income support or on low incomes.

*Free school meals* are provided by local education authorities to children of families receiving income support. Such authorities also have discretion to provide free meals to all children from low-income families.

*Exemption from NHS charges.* Families on low incomes, childrer and young people are exempt from NHS charges. People or income support, family credit or on low incomes may qualify for exemption from prescription, dental and optical charges, or get help with dental and optical costs. People over pension age are automatically exempt from prescription charges, as are people with certain specified illnesses. Pregnant women or those who have had a child recently are exempt from both prescription and dental charges, and can get free milk and vitamins until the child is five if the family has a low income. Help with fares to hospital is also available.

*Other means-tested benefits* include discretionary provision by local authorities for help with school uniform and Educational Maintenance Allowances for children staying on at school after 16 years of age.

*Additions to social security benefits for dependants*

People who receive one of the main long-term contributory benefits (industrial benefits, invalidity pension, widow's benefits, retirement pension) or a main non-contributory benefit are entitled in certain circumstances to increases in benefit for dependent children or for one additional dependent adult, usually a spouse. They are payable in addition to child benefit.

*One-parent families*

Three benefits are exclusive to one-parent families and in addition favourable conditions for them apply in other benefits.

(a) *One-parent benefit* is payable to a person (not necessarily the parent) who has the sole responsibility for bringing up a child or children. It is estimated that about 60% of those who qualify for the benefit have claimed it: about 590 000 families in 1986.

(b) *Widowed mothers allowances* are paid to widows under pensionable age for 26 weeks after their husband's death, with dependency additions for their children. After the first 26 weeks provided they meet contribution qualifications, widows caring for



their late husbands' children are entitled to *widowed mothers allowance*.

(c) *Child's special allowance* is payable to a divorced woman on the death of her former husband if he contributed, whilst living, towards the support of the child.

*Special enhancement of other schemes.* Some schemes, particularly income support, have special enhancements for lone parents. The income support scheme favours lone parents by not requiring them to register for work as a condition of receiving benefit; by more generous treatment of part-time earnings and by allowing adult-scale rates for young teenagers. Over a third of all lone parents get income support at any one time and there are twice as many lone parents receiving income support as two-parent families.

The same amount of family credit is paid in spite of the fact that there is one less adult in the family to support. More than half the families getting family credit are lone parents. Extra income tax allowances are available to lone parents to bring their allowance up to the level of a married man.

## **VACCINE DAMAGE PAYMENTS SCHEME**

This scheme was introduced in the late seventies and provides a tax free lump sum (£20 000 in 1986) for a person who has suffered severe and permanent damage as a result of vaccination under a routine public policy vaccination programme (Vaccine Damage Payments Act 1979).

### **People who qualify**

A person is eligible for payment if she/he has been *severely damaged* as a result of vaccination against diphtheria, tetanus, whooping cough, poliomyelitis, measles, rubella, smallpox or tuberculosis. Payments can also be made to people damaged before birth as a result of vaccinations given to their mothers, and to people who have contracted polio through contact with someone who has been vaccinated against it.

The claimant must also satisfy the following conditions:

- (i) The vaccination must have been given in the UK or Isle of Man;
- (ii) The vaccination must have been given either when the claimant was under 18 years (except for rubella and poliomyelitis) or during an outbreak of the disease in the UK;
- (iii) The claimant must be over the age of 2 years on the date of the claim. If she/he has died, she/he must have died after 9 May 1978 and have been over the age of 2 years;

- (iv) The claim must be made within 6 years of the vaccination, if she/he was under 2 years when vaccinated, the claim must be made within 6 years of her/his second birthday;
- (v) The claimant must normally live in the UK or the Isle of Man;
- (vi) If the claimant contracted polio through contact with someone who was vaccinated against it, she/he must have been in 'close physical contact' with that person during the 60 days from the fourth day following the vaccination.

Up until 1985 the total number of payments awarded was 831. In 607 of these awards, the claimant stated that the vaccination was pertussis or included in a pertussis element. Awards have been given to claimants who have been vaccinated since the establishment of the National Health Service in 1948. Of the 831 awards up to 1985, 95% had been vaccinated before 1980 and 65% before 1970.

### Severe damage

A person is defined as severely damaged when the disablement due to vaccine damage is assessed at 80% or more (as for severe disablement allowance described earlier). This excludes many people who can prove that they have been damaged by vaccination but have been assessed at less than 80%.

The payment does not prejudice any legal right the person may have to sue for damages in consequence of the disablement, but will be taken into account in assessing the amount of damages awarded. To date, however, only one case has been decided before the courts; another case was withdrawn during the summer of 1986. A vaccine damage payment held on trust for a dependant child will not be taken into account for the purposes of supplementary benefit.

Leaflets giving details of the scheme can be obtained from local DHSS offices.

### REFERENCES

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## Mentally disordered people

### INTRODUCTION

Mental disorder is a generic term which includes mental illness and mental handicap. It encompasses a heterogeneous collection of conditions which probably present one of the major health and social problems of today's society. It is only recently that the subject has emerged from the dark shadows of ignorance and superstition into the harsh light of scientific scrutiny.

Although the attitude of society is changing, mental disorder continues to carry a stigma. The great bulk of conditions cannot be 'cured', thus many health professionals find the pursuit of a career which means caring for chronically socially incapacitated patients an unattractive one. As a result the service, which lacks glamour and prestige, has received a diminishing share of limited resources and has been labelled a 'Cinderella' branch of the National Health Service.

The effects of mental disorder are reflected at a personal level in the unhappiness of patients and their relatives and, nationally, in the impact on the economy, with the loss of more than 30 million working days each year.

More than any other medical discipline, many of the underlying disease processes have yet to be explained. Nevertheless, considerable encouragement can be taken from the interest that has been shown and contributions which have been made, by members of other disciplines, such as epidemiology, biochemistry, sociology and anthropology.

The first part of the chapter covers mental illness and the second part mental handicap. The related subjects of suicide and parasuicide; alcohol and drug abuse are included within the sections on mental illness. Dementia is discussed in the chapter on elderly people.

### Some statistics

#### *Facilities for mentally disordered in England<sup>1</sup>*

- 40 000 adult training places
- 80 000 places in ESN (M) schools

- 35 000 places in ESN (S) schools
- Forty-five per cent of NHS hospital patients are in mental illness or mental handicap hospitals
- Forty per cent of the beds for mental handicap are in hospitals with over 1000 beds

*Staff caring for mentally-disordered people<sup>1</sup>*

- Eleven per cent of all consultants are psychiatrists
- Nine per cent of all medical staff work in hospitals for the mentally ill or mentally handicapped
- The proportion of qualified to unqualified psychiatric nurses is 55:45
- Hospitals for the mentally ill – 55 nurses to 100 patients, 29 of them qualified
- Hospitals for the mentally handicapped – 48 nurses to 100 patients, 20 of them qualified
- Non-psychiatric hospitals – 122 nurses to 100 patients

*Long-stay patients in mental illness hospitals in England*

- In the 1930s 90% of patients stayed in mental illness hospitals for more than one year
- In 1975 69% of patients had stayed in mental illness hospitals for more than one year
- Re-admissions account for two-thirds of all admissions to mental illness hospitals

*Costs of hospital and hostel care<sup>1</sup>*

- In 1977 the cost per in-patient week was:
  - £244 in acute general hospitals
  - £81 in mental illness hospitals
  - £70 in hospitals for the mentally handicapped
- Local authority average weekly hostel costs:
  - £45 for mentally handicapped adult
  - £41 for mentally ill person
  - £86 for mentally handicapped child

*Where mentally handicapped people live<sup>1</sup>*

- 160 000 severely mentally handicapped people live in the UK
- 60 000 of these are children
- Eighty per cent of the children live at home
- Sixty per cent of adults live with families
- 50 000 are in hospitals for the mentally handicapped, 93% of whom have been in residence for more than one year
- 10 000 are in local authority hostels

## THEORETICAL CONCEPTS OF MENTAL ILLNESS

### **The medical model**

The medical model of mental illness sees it as defined on the basis of characteristic symptoms and signs, all of which reflect a background of disorders that derive from abnormal function of the brain. That few underlying abnormalities of a physiological or biochemical nature have yet been discovered in the majority of mental illnesses is no barrier to the adoption of the medical model. The model, with its emphasis on the importance of drugs and other medical treatments, is reinforced by the fact that a basic medical training is a prerequisite to embarking upon a career in psychiatry. This perspective of mental illness is not shared by all, however, and a number of other theoretical models of mental illness have been developed.

### **The psycho-analytical model**

An alternative notion of the nature of mental illness which is held in some quarters of the medical profession, is the psycho-analytical one. The theory and practice was, of course, developed by Sigmund Freud. He saw the mind as comprising three different parts: The *id*, which is the most primal force composed of an inherited set of instinctive drives which lead basically to pleasure-seeking urges and has no contact with reality; the *super-ego*, which is the conscience (controller) element, developed under the influence of society and the social environment, striving always for conformity; and, finally, the *ego*, which is that part of the psyche which, when it is in contact with external reality, balances and integrates the other two parts of the personality. An imbalance of these psychological forces, when one of them becomes dominant or fails to develop, is seen as the basis of mental illness.

Another central element of psycho-analytical theory is the importance of early childhood experience and, in particular, the way in which the child and his parents negotiate and react to, the process of psycho-sexual development.

One of the major disadvantages of psycho-analytical theories of mental illness is that, in spite of their veneer of scientific terminology, and their complexity, there is an apparent lack of any firm basis of scientific proof of their validity. Most of the psycho-analytical concepts appear to be based on theory, but there is a body of case-work developed by neo-Freudians and eclectic analysts which has gone beyond the purely theoretical stage.

### **Sociological models**

Further departures from the medical orientation towards mental illness, are contained in various sociological theories of its origin. Most

of these view mental illness as the result of an interaction between the individual and society. The mentally ill person, judged by the things he says and by his behaviour in general, tends to be regarded by others as deviant from society's norms and expectations. The reaction of society to this aberrant individual leads to his being identified as 'mentally ill'. This process is one which he accepts and therefore conforms to societal expectations of a person with mental illness. A more extreme view of this process is the so called 'labelling theory', whereby mental disorder is seen as arising from society's reaction to abnormal behaviour. In other words, widely held stereotypes of madness or insanity mean that when an individual is labelled mentally ill, he tends to adopt this stereotype.

In philosophical terms sociological models are open to the same kind of criticisms as analytical theory and because of their breadth are infinitely more difficult to test.

## **MENTAL ILLNESS - THE NATURE OF THE PROBLEM**

### **Definition and classification**

Whatever theoretical explanations of mental illness are accepted, a problem remains for those responsible for planning and providing services for the mentally ill: that of deciding upon a satisfactory method of measuring the amount of mental illness in the population. In the case of organic illness, evidence in support of a diagnosis may be accumulated through a variety of sources.

In the field of psychiatry, however, the formulation of a diagnosis often relies very heavily on the psychiatric interview and very little on the sort of additional data that are available to the general physician. Consequently there is often a great deal of variation between the opinions of individual psychiatrists as to what diagnosis ought to be applied to any one particular problem. This may appear to an individual psychiatrist in his own practice to matter little. However, as soon as observations on patients from different populations are grouped together for the purpose of making comparisons or testing hypotheses, it is essential to ensure that like is compared with like.

### ***Cross-national study***

An illustration of apparent variations in the occurrence of psychiatric illness which can be explained partly by variations in the diagnostic process, is provided by considering a cross-national study carried out in the mid-1960s. It had long been recognized that there were apparent differences in the frequency of certain psychiatric illnesses in the

United States of America compared with the United Kingdom. If such differences were real, then valuable clues as to the causes of certain psychiatric illnesses might be available. These considerations gave rise to an investigation into the differences.

Table 7.1 shows the results of an analysis of two samples of admissions, one from hospitals in New York City and one from hospitals in London. There appeared to be a much higher percentage of schizophrenics and alcoholics in the New York sample than in the London sample. In contrast, patients with depression and mania were much more common in the London sample. Using a standardized interviewing technique each patient in the samples was examined by a member of a team of project psychiatrists as soon as possible after admission, and independently of the hospital staff. Table 7.2 shows the results of comparing hospital diagnoses with the project diagnosis in the two samples. Once alcoholics and drug addicts had been excluded, the comparison of the two sets of project diagnoses showed no significant difference for schizophrenia, personality disorders, neurosis (other than depressive) and organic psychosis. This suggests that the differences – in terms of hospital diagnoses – between the two centres were largely the result of variation in the diagnostic criteria used by the psychiatrists. The report concluded that the most important of these differences is that the New York concept of schizophrenia is much broader than that used in London, and included cases which many British psychiatrists would call depressive illnesses, neurotic illnesses or personality disorders (see Figure 7.1).

**Table 7.1** The hospital diagnoses of the London and the New York samples

	<i>New York (%)</i> <i>(n = 192)</i>	<i>London (%)</i> <i>(n = 174)</i>
Schizophrenia	61.5	33.9**
Depressive psychoses	4.7	24.1**
Mania	0.5	6.9**
Depressive neuroses	1.6	8.0**
Other neuroses	2.6	5.7
Personality disorders	1.0	4.6*
Alcoholic disorders	19.8	3.4**
Drug dependence	0	0.6
Organic psychoses	5.2	1.7
Other diagnoses	3.1	10.9**

\* Difference significant at 5% level

\*\*Difference significant at 1% level

Source: Cooper, J. E. *et al.* (1972). *Psychiatric Diagnosis in New York and London: a Comparative Study of Mental Hospital Admissions*. (London: Oxford University Press)



**Table 7.2** The project diagnoses of the London and New York samples after the exclusion of alcoholics and drug addicts

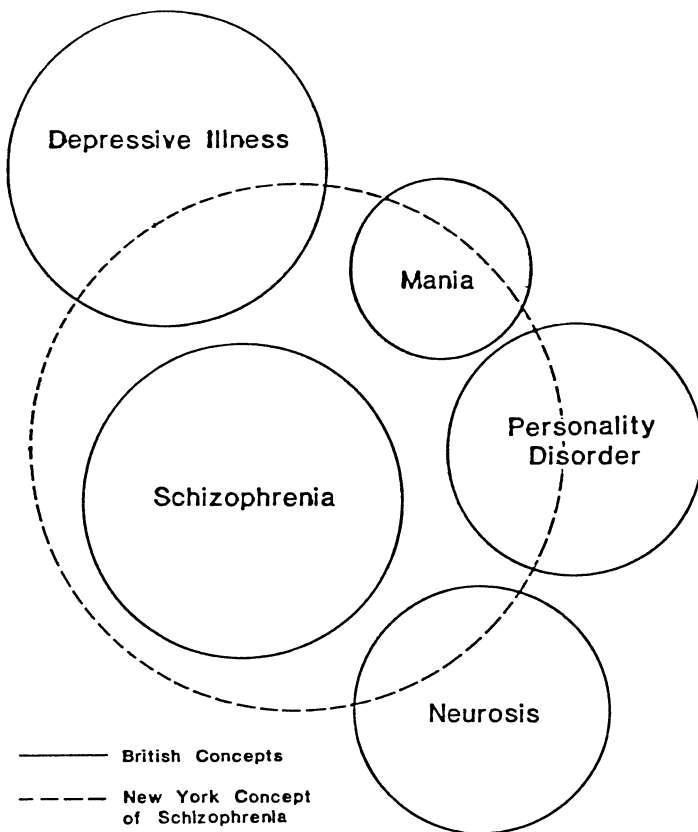
	New York (%) (n = 142)	London (%) (n = 165)
Schizophrenia	39.4	37.0
Depressive psychoses	26.8	24.2
Mania	7.7	6.7
Depressive neuroses	9.2	15.2
Other neuroses	2.1	4.2
Personality disorders	5.6	3.6
Organic disorders	3.5	3.6
Other diagnoses	5.6	5.5

Source: Cooper, J. E. *et al.* (1972). *Psychiatric Diagnosis in New York and London: a Comparative Study of Mental Hospital Admissions*. (London: Oxford University Press)

### *Psychiatric diagnosis*

The formulation of a psychiatric diagnosis consists of two main stages: the first depends on the way the psychiatrist makes his observations of the patient and then interprets them; the second depends on the way in which these judgements are classified in a particular disease category. Variation can occur at both points. It has been shown that there is poor agreement between the observations recorded by different psychiatrists interviewing the same patients independently. Such observer variation or observer error is also seen in other fields of medicine, for instance in blood pressure recording (see Chapter 1). Attempts have been made to overcome these difficulties by the design of standardized interviewing schedules, e.g. the present State Psychiatric Examination Schedule devised by Professor John Wing and his colleagues at the Institute of Psychiatry in London.<sup>2</sup> Although such initiatives have been used for research purposes they have not gained widespread acceptance clinically, although many believe that they should.

The process of classification of illness may also constitute a problem. Considerable disagreement exists, for instance, amongst psychiatrists about which symptoms or abnormal behaviour must be present before a particular diagnosis is made. Factors such as background, training and culture may in part account for these differences. An attempt to achieve a uniformly applicable classification is demonstrated by the current (ninth) revision of the World Health Organization's *International Classification of Diseases*. The original use of the *International Classification of Diseases* lay in classifying causes of death. More recently it has been broadened to include non-fatal conditions (see Chapter 1). Table 7.3 shows a section from the chapter on mental disorders. It should be noted that it differs from those on organic



**Figure 7.1** The difference between the New York and British concepts of schizophrenia. Source: Cooper, J.E. *et al.* (1972). *Psychiatric Diagnosis in New York and London: a Comparative Study of Mental Hospital Admissions*. London: Oxford University Press.

illnesses by containing a detailed glossary to help in deciding upon the most appropriate classification of a psychiatric illness. Influence of the *International Classification of Diseases* on everyday practice has, however, been slight.

### SOURCES OF INFORMATION ON CASES OF MENTAL ILLNESS

Such variation in the diagnosis and classification of mental illness makes it difficult to group together data for purposes of comparison. Even if agreement is reached upon criteria of diagnosis for particular diseases, the next step in estimating the amount of mental illness in a

**Table 7.3 Towards uniformity in diagnostic classification: extracted from chapter on Mental Disorders in the International Classification of Diseases***301 Personality disorders\**

Deeply ingrained maladaptive patterns of behaviour generally recognizable by the time of adolescence or earlier and continuing throughout most of adult life, although often becoming less obvious in middle or old age. The personality is abnormal either in the balance of its components, their quality and expression or in its total aspect. Because of this deviation or psychopathy the patient suffers, or others have to suffer, and there is an adverse effect upon the individual or on society. It includes what is sometimes called psychopathic personality, but if this is determined primarily by malfunctioning of the brain, it should not be classified here but as one of the non-psychotic organic brain syndromes (310). When the patient exhibits an anomaly of personality directly related to his neurosis or psychosis, e.g. schizoid personality and schizophrenia or anankastic personality and obsessive compulsive neurosis, the relevant neurosis or psychosis which is in evidence should be diagnosed in addition.

Character neurosis

*301.0 Paranoid personality disorder*

Personality disorder in which there is excessive sensitiveness to setbacks or to what are taken to be humiliations and rebuffs, a tendency to distort experience by misconstruing the neutral or friendly actions of others as hostile or contemptuous, and a combative and tenacious sense of personal rights. There may be a proneness to jealousy or excessive self-importance. Such persons may feel helplessly humiliated and put upon; others, likewise excessively sensitive, are aggressive and insistent. In all cases there is excessive self-reference.

Fanatic personality

Paranoid personality (disorder)

Paranoid traits

Excludes: acute paranoid reaction (298.3)  
 alcoholic paranoia (291.5)  
 paranoid schizophrenia (295.3)  
 paranoid states (297.-)

*301.1 Affective personality disorder*

Personality disorder characterized by lifelong predominance of a pronounced mood which may be persistently depressive, persistently elated, or alternately one then the other. During periods of elation there is unshakeable optimism and an enhanced zest for life and activity, whereas periods of depression are marked by worry, pessimism, low output of energy and a sense of futility.

Cycloid personality

Depressive personality

Cyclothymic personality

Excludes: affective psychoses (296.-)  
 cyclothymia (296.2-296.5)  
 neurasthenia (300.5)  
 neurotic depression (300.4)

\*This term includes 8 additional types of personality disorder not extracted here.

Source: World Health Organization (1978). *Mental disorders: glossary and guide to their classification in accordance with the ninth revision of the International Classification of Diseases*. (Geneva: World Health Organization)

population is to identify people with the disease. Four main strategies have been used: hospital-based studies, studies of general practice populations, special community surveys and psychiatric case-registers.

### **Hospital statistics**

Since the practice of psychiatry, in Britain at least, has traditionally been hospital based, it is perhaps not surprising that a great deal of data on hospitalized patients has been collected. One of the earliest attempts to do this in a systematic way was that made by Maudsley at the end of the last century. He counted the number of insane people being treated in England between 1859 and 1870 and chronicled a dramatic increase over this time period. Today the Mental Health Enquiry is the method by which statistics on psychiatric in-patients are collected from all National Health Service psychiatric hospitals and psychiatric units in England and Wales. Detailed information is collected about each admission and discharge. The source document provides copies of the data for local research or administrative purposes. This, along with other hospital in-patient data systems, is currently under review (see Chapter 1). In addition, tabulations are published by the Department of Health and Social Security from time to time<sup>3</sup>, although a very limited amount of information is produced compared with the amount collected, and the analyses are very simple. The use of the Mental Health Enquiry data for local research and planning purposes has been extremely disappointing.

In addition to these routinely collected statistics on psychiatric in-patients, many *ad hoc* surveys have investigated psychiatric illnesses using populations of psychiatric in-patients and of out-patients. The danger in such studies arises when the assumption is made that admission rates to hospital for particular conditions are synonymous with their incidence in the population, an issue which is also discussed in Chapter 1. Perhaps the most obvious reason why the study of hospital in-patients only, incompletely describes the problem, is that in general the more serious illnesses are seen in hospital. The less serious or minor ones may be seen and treated by a general practitioner, go unrecognized, or present in some other form to another kind of agency – for instance, the police or the social services department.

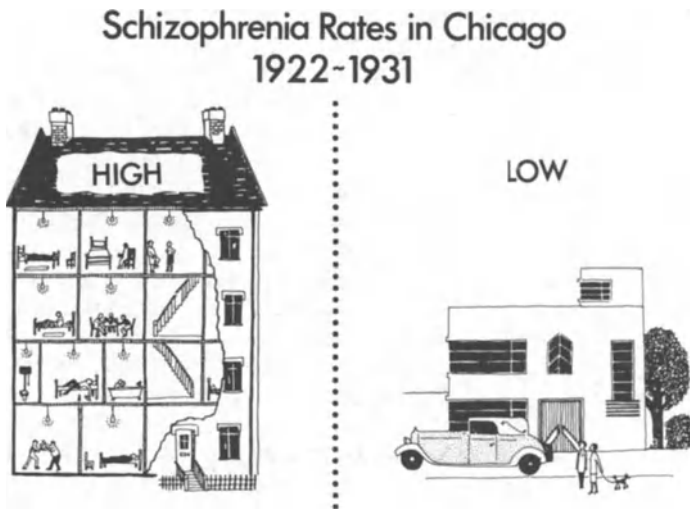
The fact that fewer people in one area are admitted to hospital than in another, may not be an indication of the lower occurrence of mental illness, but may reflect the availability of facilities, the policy for admission, the social stigma attached to mental illness in general or to a particular institution for its treatment, or the tolerance of the community towards abnormal behaviour. Other factors determining whether or not a person with a particular psychiatric illness comes to

the attention of hospital-based services may be the extent to which he or his relatives perceive an abnormality and consider it necessary to make contact with services. This, in turn, may depend upon whether the abnormality interferes with the social functioning either in the patient's job or in the discharge of his other social responsibilities.

### *Schizophrenia and social class*

One of the earliest and best known examples of the use of hospital admissions to study mental illness was the investigation of the relationship between schizophrenia and social class carried out in the 1930s in Chicago<sup>4</sup>. First-admissions rates to hospital for schizophrenia were used to pinpoint differences in its frequency between parts of Chicago. The question of selection bias (discussed above) is not further raised here, except to say that first-admission rates for schizophrenia at that time are probably a fair approximation of incidence, since most people were hospitalized at some stage during the first illness. It was observed that the mental hospital admission rates for schizophrenia were highest in the central slum districts, with much lower rates in the outer residential areas of the city (Figure 7.2). One interpretation of these observations was that since the poor areas contained many people of lower socio-economic status, it was therefore the environment, lifestyle and living conditions of people in the lowest stratum of society that predisposed them to the disease. This hypothesis appeared to be substantiated by a later study which looked at first-admission rates to all psychiatric services, including out-patients in a defined geographical area – New Haven, Connecticut. The results appeared to show that people in lower social classes had a higher incidence of schizophrenia. This phenomenon became known as 'the breeder hypothesis'; adverse social circumstances were seen as 'generating' mental illness. Some doubt was shed on it by the observation that poor areas and social isolation do not necessarily go together, at least in European cities, and that schizophrenic patients quite often moved into isolated areas before admission to hospital.

British workers then provided important new evidence: their findings are presented in Table 7.4. They compared the social-class distribution of young male patients who had schizophrenia on first admission to mental hospitals with that of their fathers at the time of the patient's birth. It was found that although the patients had a marked excess of Social Class V jobs, they had been born into families with a similar social-class distribution to that of the general population. The implication was that there had been a 'drift' downwards in the social classes of schizophrenic patients as a result of their illness; this contradicts the 'breeder hypothesis' which suggested that socio-economic deprivation is of major aetiological importance. It is now



**Figure 7.2** Diagrammatic impression of the study of Faris and Dunham<sup>4</sup>

**Table 7.4** Social-class distribution of schizophrenic patients and their fathers (Males, first admissions aged 25-34 years, England and Wales, 1956)

Social class	Patients at admission		Fathers at patient's birth	
	Observed	Expected	Observed	Expected
I	12	12	14	8
II	21	44	42	42
III	178	203	192	192
IV	52	55	66	68
V	90	39	55	59
Total	353	353	369	369
Not stated	18			

Source: Goldberg, E. M. and Morrison, S. L. (1963). Schizophrenia and social class. *Br. J. Psychiat.*, **109**, 785-802

more generally believed that the preponderance of Social Class V patients with schizophrenia is due to the disabling effect of the illness (the drift hypothesis) rather than being caused by poor environmental circumstances (the breeder hypothesis).

### **Psychiatric morbidity in general practice**

The use of general practice as a basis for research on members of the

community has the immediate attraction that with the comprehensive coverage provided by the National Health Service, a high proportion of the population is registered with a general practitioner. No statistics are routinely collected on contacts of patients with general practitioners, but over the last two decades a number of studies have looked at various aspects of psychiatric morbidity in general practice (e.g. Ref. 6). Studies of the general practice population give an indication of the distribution of less severe psychiatric conditions and highlight the importance of the psychological components of illness to the work of the general practitioner. In addition, this population gives a fuller indication of the natural history of mental illness. There are, however, special difficulties which limit the conclusions which may be drawn from the results. Rates of psychiatric illness reported by general practitioners vary widely. The report of a single general practitioner is of little value when extrapolated to the whole population. The patients in the practice may not be typical, and the diagnostic criteria and classification adopted by the general practitioner may not be satisfactory. Larger studies involving many general practices have the problem that it is difficult to obtain a random sample of doctors who are willing to co-operate. When a group is used who are in part self-selecting, then bias may be introduced. The extra paperwork which is required of participants may lead to cases being inadequately documented or even overlooked. In addition to the general problems of diagnosing psychiatric illness, the general practitioner faces the extra problem of how to recognize and classify cases of physical illness which may be interpreted as having a psychological or emotional component. There seems little doubt that a substantial part of the work-load of general practitioners comprises patients with psychiatric symptoms. A survey carried out in 1971–1972 of over 50 practices in England and Wales and involving up to 300 000 people found that on average one woman in seven and one man in 14 consulted their general practitioner for some form of mental illness during the course of a year<sup>7</sup>. Mental illness was defined by previously agreed diagnostic criteria. The sample was not randomly chosen, but if these practices were typical of all practices in Britain then about 5 million people would be reporting to their general practitioner each year with mental illness.

### *Community surveys*

The disadvantage of statistics of mental illness that are based on sources drawn from hospitals or even general practices is that they fall short of providing an impression of the full extent of mental illness present in a population. With this consideration in mind, attempts have been made to identify illness by interviewing random samples of the general population to assess the condition of their mental health. Wide

diversity occurs in the prevalence of mental disorders detected by such community surveys, a variation which, once again, is mainly due to differences in the criteria used to define psychiatric disorder. A well known example of such a study was the Mid-Town Manhattan Project<sup>8</sup>. Some 1660 subjects were chosen at random from a population of 110000 white people between the ages of 20 and 59 years. Each was interviewed by a team of non-medical staff trained to elicit the presence of a range of symptoms. From the results of these interviews, two psychiatrists made independent mental health evaluations of each respondent. They judged that 23% of people were 'impaired' on a 6-point scale of symptoms and only 18.5% were considered to be 'well'. This seemingly very high level of psychiatric symptoms is surprising; but it may be that at certain times, many members of the population experience symptoms from which they recover without treatment although others are clearly in need of some form of help from the services, but do not get it. Large community surveys of this sort are impractical on a wide scale for planning purposes, but if they are carried out occasionally, they serve to emphasize the extent of unmet need in a community. Again, because of failure to adopt standard diagnostic criteria and classifications, there are few generalizations that can be made from many published surveys about the frequency of psychiatric disorders in total populations.

### **Psychiatric case registers**

The final strategy for identifying cases of psychiatric illness in a population is the production of a psychiatric case register<sup>9</sup> which, in many ways, is a synthesis of aspects of the other three methods described. The case register records and collects information concerning the contacts made by individuals residing in a defined geographical area that has a specified set of psychiatric facilities. It does not mean that the register merely records numbers of contacts or events, but having identified an individual making contact with services, it monitors any future contacts so that the register becomes, after a time, cumulative.

Amongst the best-known psychiatric registers developed in the United Kingdom are those in Camberwell, Salford and Aberdeen. They may be used to trace the natural history of disease, to identify groups of high risk, and to determine the pattern of use of services and the extent to which needs are being met. The psychiatric case register is not without limitations, but avoids some of the selection biases encountered in hospital in-patient studies.



## **USE OF PSYCHOTROPIC DRUGS**

The use of psychotropic drugs (those drugs which exert an effect on the mind) provides another perspective on the size of the problem of mental illness in society. They are the largest group of drugs prescribed in terms of both cost and number, accounting for about a fifth of all prescriptions. One-tenth of the adult population is taking psychotropic drugs at any one time.

Psychotropic drugs include the older hypnotics and sedatives such as barbiturates, the neuroleptics (major tranquillizers) such as chlorpromazine, anxiolytics (minor tranquillizers) such as benzodiazepines, and anti-depressants such as tricyclic compounds.

Chlorpromazine (Largactil) and the tricyclic anti-depressants were developed in the 1950s and their effectiveness was partly responsible for the post-war therapeutic optimism. In 1960, chlordiazepoxide (Librium) was introduced and was followed by a series of related compounds like diazepam (Valium) and nitrazepam (Mogodon). The largest increase has been in the use of tranquillizers and anti-depressants. The benzodiazepines have greatly increased in use since 1966 and have largely replaced the barbiturates. Nitrazepam (Mogodon) in particular, is prescribed as a sleeping tablet for patients at home and in hospital. During the past few years there has been much anti-barbiturate propaganda, which in part is responsible for a welcome fall-off in their use.

Psychotropic drugs have become the mainstay for the treatment of a wide range of emotional conditions in general practice, and form a third of all long-term repeat prescriptions. Many patients on long-term treatment of this kind are elderly (38% females, 27% males over 75 years) and many go for a considerable time without seeing a doctor though continuing to take medication.

Psychotropic drugs are expensive but profitable for pharmaceutical companies that invest heavily in sales promotion. On the other hand, psychotropic drugs played a major part in transforming psychiatric practice, allowing a greater increase in community care for the mentally ill.

## **SOME SPECIAL PROBLEMS**

### **Suicide and parasuicide**

#### *Suicide*

The classic work of the famous French sociologist Durkheim (1858–1917) on suicides during the latter part of the last century is a landmark both in his own discipline and in social psychiatry.

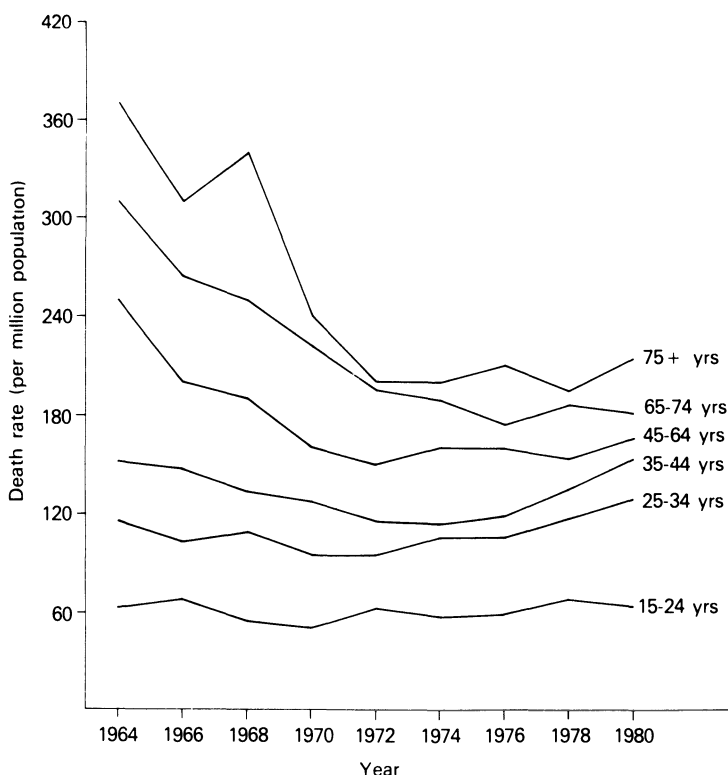
Durkheim, by studying statistics from various European countries as well as by analysis of case records, concluded that suicide was a relatively stable characteristic with a fixed rate for a given society which reflected its culture. He considered that factors in society, such as the degree of social cohesion, exercised a powerful effect on the individual which might predispose him to suicide. Durkheim's studies were spread over many years and amongst his conclusions were that suicide rates were higher amongst Protestants and the well-to-do and lower with Catholics and the poor.

*Size of the problem.* Unnatural deaths are reported to the coroner who, on the assembled evidence, decides whether the verdict is suicide, if necessary with the aid of a court and a jury. However, the way in which the Coroner's Court operates means that if there is doubt about the intention of the deceased, then an accidental death or open verdict is recorded. There is wide agreement that this and possibly other factors account for an underestimation of the true frequency of suicide. There is no way of knowing the extent of this discrepancy but various investigators have suggested that the 'true' figure is about a third greater than the recorded one.

However, published statistics rely solely on officially confirmed suicides. In England and Wales in 1980, the suicide rate was 8.2 per 100 000 population with the rate for males 11.0 and for females 6.7, representing a total of 4321 deaths for the two sexes combined.

*Trend in suicide rates.* During the last two decades the suicide rate among the younger groups remained fairly steady whilst there has been a substantial fall in the occurrence of suicides in the oldest age groups. Since 1975 this trend appears to have reversed and the suicide rate increased up to 1980 (see Figure 7.3). At the beginning of this century male suicide rates were three times greater than those for females. This difference has narrowed so that the male rate is now one and a half times the female rate. As Figure 7.4 shows suicides also decreased during the two World Wars, possibly as a result of high employment and a greater feeling of national cohesion. High suicide rates in the 1930s have often been attributed to high unemployment during the period of economic depression, but this fails to explain the peak amongst people who are retired.

Contrary to the experience in England and Wales, suicide rates in most European countries have increased since the 1960s with rises of up to 30% in countries such as Hungary, Ireland and The Netherlands. On the other hand, places such as Scotland and Greece have shown a decline. England and Wales now have amongst the lowest suicide rates in Europe, although interpreting these data requires care, as different

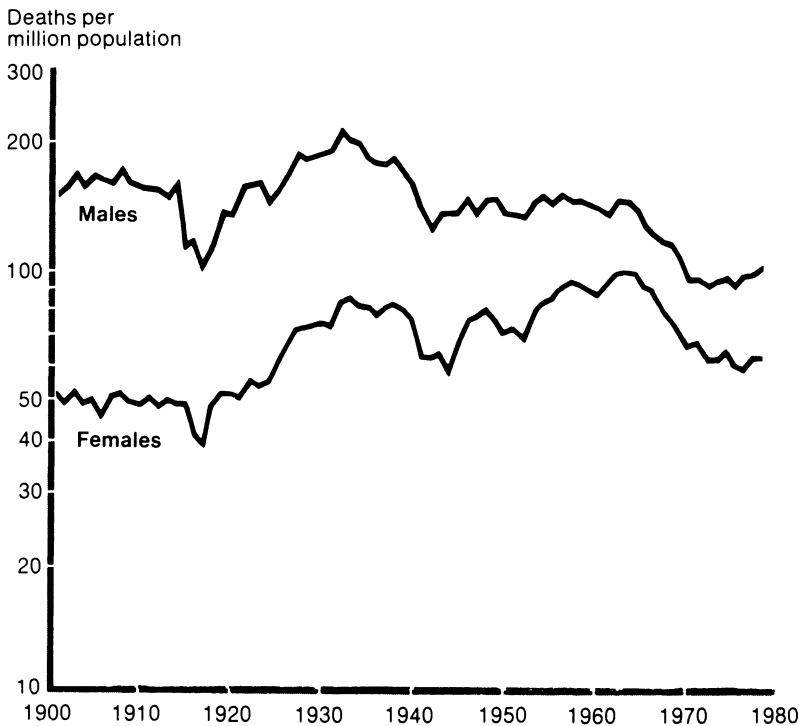


**Figure 7.3** Male suicide rates (per million population) by age, 1964–1980, England and Wales. Source: Extracted from various publications of mortality statistics produced by the Office of Population Censuses and Surveys

countries have different criteria for attributing deaths to suicide.

There is little doubt, however, that the fall in suicide rates in the 1960s in England and Wales was genuine and this subject has been closely studied.

The most strongly supported explanation for the decline in suicides is the replacement of coal-gas by natural gas. Coal-gas contains up to 20% of poisonous carbon monoxide and was a popular method of committing suicide in England and Wales: it was painless, freely available and not disfiguring (see Figure 7.5). Domestic installations of natural gas, which contains little carbon monoxide, were introduced from the mid-1960s onwards and coincided with the decline in suicide rates. Analysis of the data showed that the reduction in the numbers using coal-gas as a means to commit suicide could account for the

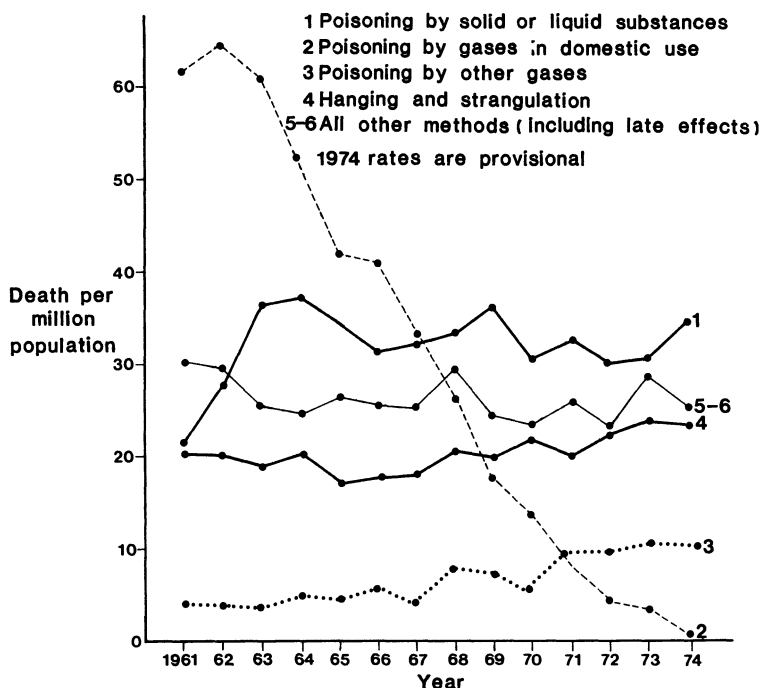


**Figure 7.4** Suicides: Crude death rates per million living, by sex, 1901–1978, England and Wales. Source: Office of Health Economics (1981). *Suicide and Deliberate Self-Harm*. (London: OHE)

lowering of the total suicide rate. Although parts of The Netherlands have also been converted to natural gas they have experienced an increased suicide rate, but suicide by coal-gas has never been popular in Holland. In Western Europe hanging and strangulation, and in America the gun, are the most frequent methods of suicide.

It has also been suggested that better care of the elderly may be a cause since the fall in suicide rate is largely accounted for by the sharp decrease in the rate for those over 65 (Figure 7.3). The anti-depressant drugs introduced in the late 1950s might explain the change, though other countries using these drugs have not had this experience. The follow-up of cases of parasuicides with psychiatric treatment has also been put forward as a contributing factor, but with little supporting evidence.

It would be fair to say that there is no single satisfactory explanation of this trend.



**Figure 7.5** Male suicide rates: methods of suicide 1961–1974, England and Wales. Source: Adelstein, A. and Mardon, C. (1975). *Population Trends*, No 2. (London: HMSO)

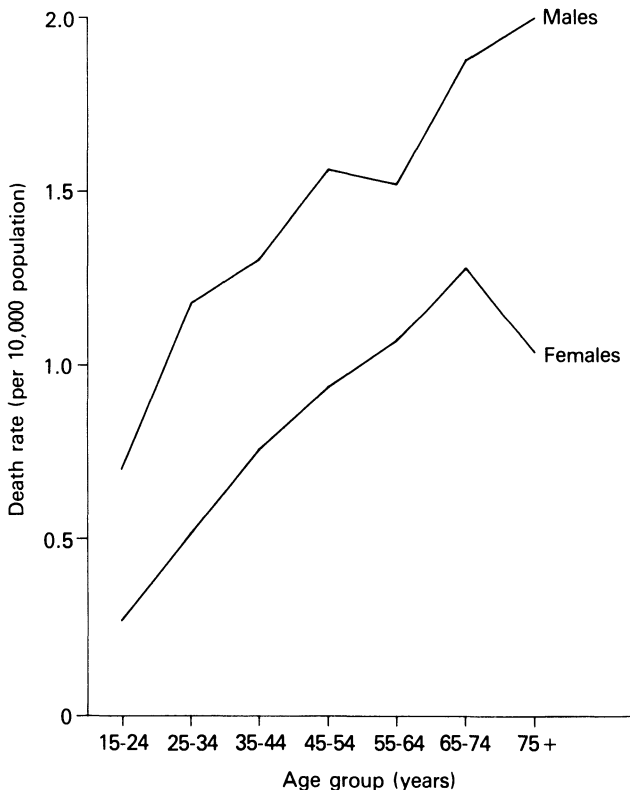
*The Samaritans.* The Samaritans are the best known of the organizations which help people in distress. This scheme was introduced into Britain in the early 1950s and provides a 24-hour telephone service manned by volunteers which is available to potentially suicidal people. Published studies which have attempted to evaluate the Samaritans scheme are open to serious methodological criticism and it is not possible to state clearly whether the service is an effective preventive measure.

*Characteristics of suicide.* People with pre-existing mental illness, alcoholics and those with serious physical illness are at greater risk of committing suicide. Suicides are more common in males than in females but in both sexes the rate increases with age, being highest in middle and old age (see Figure 7.6). The incidence is greater amongst single, widowed and divorced people, those recently bereaved, those living in urban areas and those in the highest and lowest socio-

economic groups. As many as a third may have a history of previous parasuicide, 20% will have made contact with medical services, half within a week of the suicide event. There is an unexplained seasonal variation in suicide, with a peak occurrence in the spring.

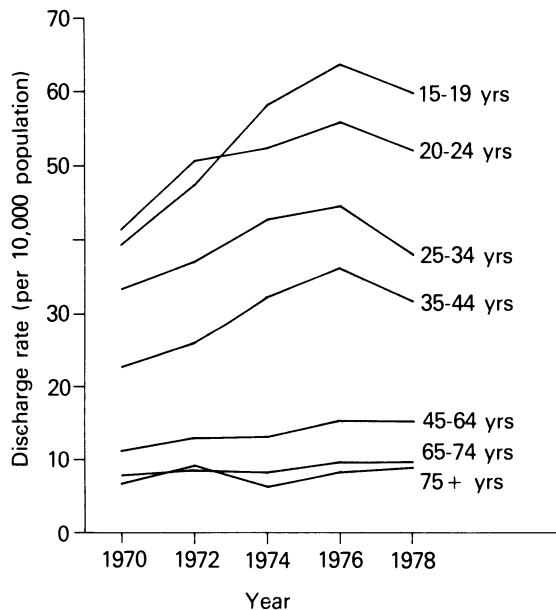
### *Parasuicide*

The term 'attempted suicide' used to be applied to an act in which a person had tried to kill himself but had not been successful. More recently, it has been realized that many so-called 'attempted' suicides are people who do not have death in mind as an end result. Moreover, the question of intent is extremely difficult to determine. 'Parasuicide' is the term now employed to describe behaviour which is aimed at self-harm (whether by poisoning, trauma or other means) but which does not result in death.



**Figure 7.6** Suicide rate (per 10000 population) by age and sex, England and Wales, 1978. Source: Derived from Office of Population Censuses and Surveys (1979). *Mortality Statistics: Cause*. Series DH2, No. 6 (London: HMSO)

**Size of the problem.** The population frequency of parasuicide is difficult to define accurately. Many estimates are based on cases of poisoning or self-injury admitted to hospital. The main routine source of information is the Hospital In-Patient Enquiry (HIPE) data (see Chapter 1), but from these data it is difficult to distinguish accidents from admissions which result from a deliberate attempt at self-harm. Cases treated by general practitioners and those who did not seek any medical help are not included. Figures based on hospital cases for poisoning almost certainly underestimate the true number of parasuicides in a population.



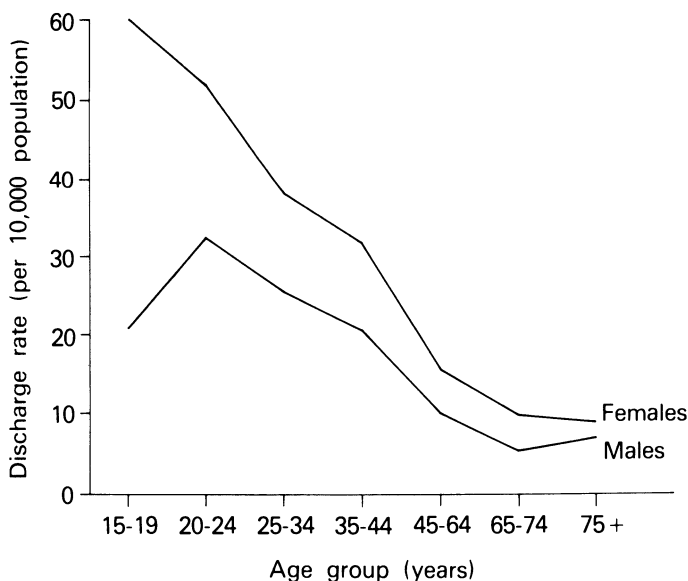
**Figure 7.7** Hospital discharge rates (per 10000 population) for adverse effects of medicinal agents in females, England and Wales, 1968-1978. Source: Derived from various reports of the Hospital In-Patient Enquiry produced by the Office of Population Censuses and Surveys

**Trends in parasuicides.** It is difficult to obtain long-term trends for the reasons described above. Even HIPE data are available only since 1949 and are especially unreliable for the period before 1961 when it was a criminal offence to attempt suicide, and hence information was concealed. Given these limitations, the trend over the last two decades for admission to hospital due to the adverse effects of medicinal agents (mainly overdose) has been upwards, although there is a suggestion of a fall in very recent years (Figure 7.7).

*Characteristics of parasuicides.* In contrast to suicide, parasuicides are more frequent in females than males and the age distribution is also different. Parasuicide tends to occur in young adults and its frequency decreases with age (Figure 7.8).

Many parasuicides are reacting on impulse to a crisis usually involving another person who is very close to them. Actions are often unplanned and there is seldom any attempt to conceal the act. This contrasts with people who are intent on committing suicide who may form a premeditated plan to ensure they are not discovered. It must be re-emphasized that although, in general, there are two distinct and different pictures, there is a large area of overlap between the two groups.

*Follow-up of cases of parasuicides.* Although the DHSS recommends that all cases of overdose or self-injury treated in hospital should be examined by a psychiatrist, this is by no means universally carried out. The intention is that they should be referred to Poisoning Treatment Centres in District General Hospitals and examined by a psychiatrist.



**Figure 7.8** Hospital discharge rates (per 10000 population) for adverse effects of medicinal agents, by age and sex, England and Wales, 1978. Source: Derived from Department of Health and Social Security, Office of Population Censuses and Surveys, Welsh Office (1981). *Hospital In-Patient Enquiry 1978*. Series MB4, No. 12 (London: HMSO)



Lack of facilities and staff means that this seldom occurs and they are transferred to medical wards after being seen in an accident and emergency department. Hospital admission does have the advantage that the problem can be investigated and allows the patient to withdraw temporarily from the situation in which the parasuicide occurred.

*Prevention.* The great majority of parasuicides and nearly 40% of completed suicides are due to overdoses of drugs, often taken with alcohol. A high proportion of the drugs are those which have been prescribed for emotional disturbances, such as psychotropics, hypnotics and other sedatives, but analgesics like aspirin and paracetamol may also be involved. Primary preventive strategies include making the means of committing suicide more difficult. The detoxification of domestic gas and the reduction in barbiturate prescriptions (from 14 million in 1968 to 5 million in 1978 in England) could be viewed in this way. It has also been suggested that aspirin and paracetamol should not be sold over the counter. This subject is continually being reviewed.

Twenty per cent of hospital patients admitted for parasuicides are repeat episodes. A number of strategies have been tried to reduce the risk of further attempts by, for example, restructuring the social environment to provide more support, but the results have been somewhat disappointing.

A number of voluntary and self-help organizations have obtained encouraging results, but overall success in preventing suicides and parasuicides has been very limited.

### **Alcoholism and alcohol-related problems**

#### *Definitions*

The definition of alcoholism poses difficulties both for the lay person and the professional. All definitions contain two main concepts: dependency and harm. In medical terms alcoholics can be defined as people who are addicted to alcohol and are unable spontaneously to give up drinking and who are suffering physical or social harm. However, the concept of alcoholism *per se* is outmoded and the more recent approach is to think in terms of alcohol-related problems, of which true alcoholism is only the extreme manifestation. A large proportion of the population drink socially without problems. Some drink excessively, giving rise to personal and social difficulties which require support and treatment. Not all are alcoholics, but many will progress to that stage.

#### *Consumption*

The annual per capita consumption of alcoholic drinks in Britain rose

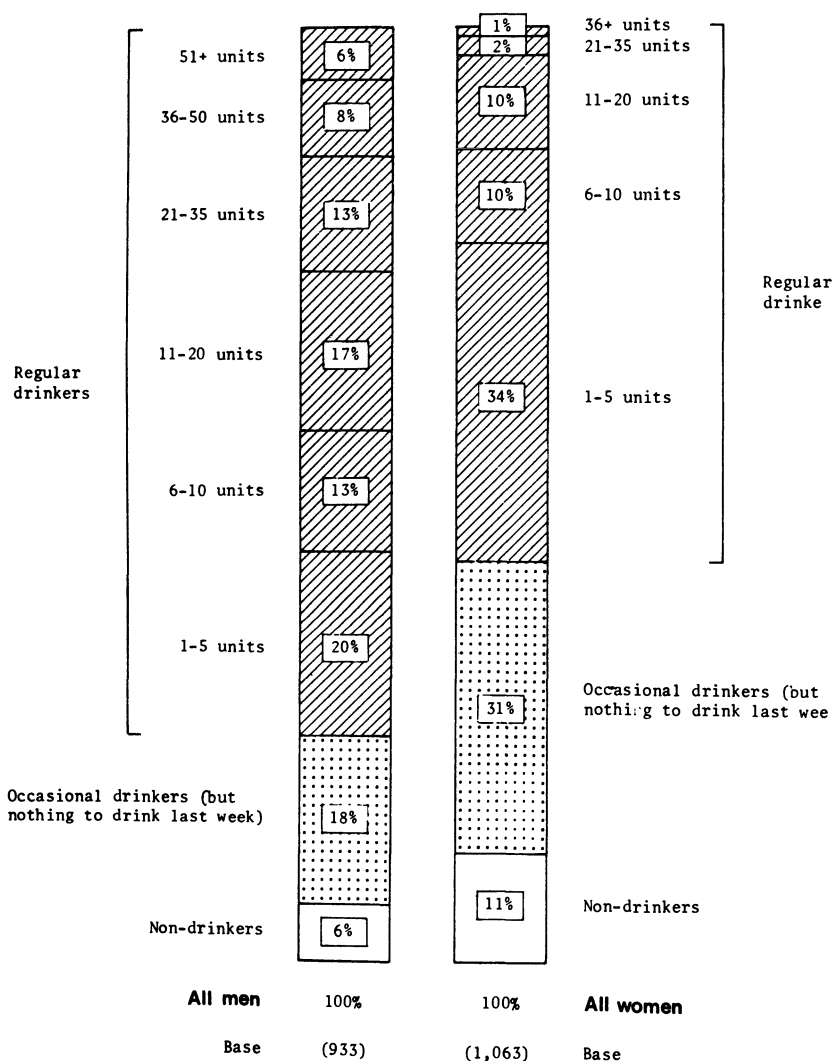
from the equivalent of 5.2 litres of absolute alcohol in 1950 to 6.5 litres in 1966, and to 11.1 litres in 1980. A change in drinking habits doubled consumption of wine and spirits between 1971 and 1981. Beer consumption on the other hand rose by 18%. As beer accounts for 75% of total alcohol consumed, it represents most of the overall increase in alcohol consumption. Part of the reason for the total increase in consumption is that women and young people tend to drink more than in the past. Information collected by the World Health Organization points to a similar increase in consumption of alcohol in many parts of the world. World statistics of production show that between the years 1960 and 1972, the output of wine producers increased by 20%, of distilled beverages by 60% and of beer by 80%. Countries with fairly complete statistics show an increased consumption of alcohol by a factor ranging from a third to five times during this period.

### *The size of the problem*

It is estimated that in England and Wales between 300 000 and 500 000 people (up to 1% of the population) are harmfully affected by long-term drinking. More, perhaps ten times this number, are dependent but at a stage not yet resulting in any damage. Obtaining valid data on drinking patterns in populations is notoriously difficult. People may not give an accurate report on what they actually drink, either due to forgetfulness or attempts at concealment, and heavy drinkers and alcoholics are likely to be over-represented amongst non-responders in such surveys.

Despite these limitations, properly conducted surveys, provided their findings are regarded only as a general guide, can give valuable information which is not otherwise available. The results of a national survey of almost 2000 men and women aged 18 years and over are shown in Figure 7.9 in relation to their reported alcohol consumption in the previous week. All alcoholic drinks were converted to standard units containing a similar quantity of pure alcohol. One standard unit therefore represents about 8.5 grams of alcohol and is equivalent to half a pint of beer, a single spirits measure, a glass of wine or a small glass of sherry. A 'heavy' drinker was classified as one drinking over 50 units in a week (for men) and over 35 units (for women). Up to this level was the upper limit of what was regarded as 'safe' drinking, the choice of a 'safe' level being derived from a Royal College of Psychiatrists' series of recommendations. It must be stated, however, that such boundaries are arbitrary and in view of the complexity of the issues, that the whole concept of definitions based purely on level of alcohol consumed must be regarded cautiously.

In the same survey, consumption was found to be greater in the youngest age groups (18–24 years), in single and divorced people, un-



**Figure 7.9** Distribution of alcohol consumed in the previous week for men and women. Source: Wilson, P. (1980). *Drinking in England and Wales: an Enquiry Carried Out on Behalf of the Department of Health and Social Security*. (London: HMSO)

employed men, and working women without children. In addition, using certain psychological and physical indicators, 5% of men and 2% of women were classified as 'problem' drinkers; again these were more frequent in the 18–24-year-old group.

Cultural influences affect drinking habits; in Scotland, for instance, there is a greater proportion of alcoholics in the population compared with England and Wales, but the amount spent on alcoholic beverages in Scotland is less because there is a greater proportion of total abstainers.

### *Problems from excessive drinking*

The harmful effects of alcohol are wide-ranging: an individual may suffer physically, mentally and socially, creating serious repercussions on his family and his immediate social network. The whole fabric of his life can be damaged. When conditions are multiplied in the community, it may constitute a serious obstacle to social and economic development, as well as placing a heavy burden on the health services. The problems found in Britain are reproduced in other countries, particularly in those where the drinking of alcohol is part of the way of life.

With the rise in consumption of alcohol there has been an increase in deaths from cirrhosis of the liver in England and Wales. First-admissions and readmissions to mental illness hospitals increased during the 1970s so that total admissions in 1970 were 6000 and by 1977 had increased to 10 600. Alcoholics have 70 times the risk of death from suicide. They also have increased mortality from certain forms of heart disease, cancer of the head and neck, strokes, pancreatitis and have an impaired ability to resist infection. Excessive drinking in pregnancy can be associated with impaired development of the child.

In addition there is a whole series of problems in society with which consumption of alcohol is closely related – crime, violence, absenteeism from work, child and wife battering, and road accidents.

### *Prevention*

The goal of prevention is not to ban alcohol but to hold consumption at least at its present level and, preferably, to reduce it. A variety of measures have been advocated to achieve this, though each stratagem has its opponents as well as its champions. The methods that follow have found a place in prevention programmes in various countries.

Some are education-based on a long-standing approach, using for instance, a 'count your drinks' theme. Despite the reservations about the idea of basing health education advice on specified levels of alcohol intake, many campaigns are based on the maximum safe level concept

discussed earlier. However, relatively small amounts of alcohol can be dangerous on any one occasion when driving or engaging in some hazardous work, e.g., in about 40% of total traffic accidents the driver has a blood alcohol level over the legal limit. Certain occupations are at high risk and thus should be a special target group for health education. These include people who have easy access to alcoholic drinks, such as those engaged in its manufacture and sale, and in professions like entertainment, the armed services, journalism and medicine. In an educational programme it is also important to impress upon members of the public the importance of influencing their colleagues whom they know to be heavy drinkers to seek help early.

Another approach is to use indirect persuasion by increasing the price of alcoholic drinks. However, in many countries throughout the world, including Britain, the price of alcohol has substantially fallen in real terms during recent years (see Table 7.5). Availability can be restricted by limiting the number of sales points or regulating licensing hours. Furthermore, controls can be exercised over the advertising of alcoholic drinks.

**Table 7.5** Number of minutes' work required to pay for certain items in 1950 and 1980

<i>Item</i>	<i>1950</i>	<i>1980</i>
1 lb Beef	43	61
1 lb Cod	30	31
Large loaf	9	10
Quart of milk	17	10
20 cigarettes	66	20
Pint of beer	23	15
Bottle of whisky	659	153

Source: *Hansard*, 13 February, 1981

In countries where the Moslem religion predominates, it may be possible to ban alcohol altogether, but in Western societies where alcohol consumption is a comparatively major component of the culture, total prohibition would certainly be unsuccessful. Indeed, the experience of the USA with prohibition and the relative failure of the temperance movement would seem to confirm this. This is where a prevention of alcohol programme differs from the anti-cigarette smoking model, because there is no evidence that alcohol taken in moderation is harmful; indeed it is probably beneficial to integration in society.

### *Treatment facilities*

Primary Care Teams, social workers and voluntary organizations all

play a very important role in supplying general and specialized help to people with drink problems. A varied but valuable contribution, not only in prevention but also in treatment, is provided by voluntary organizations which have been long established in this field (e.g. Alcoholics Anonymous).

Most mental illness hospitals now have facilities for treating alcoholics and some have specialized units. A few 'Detoxification Centres' have been established where skilled help is available to deal with severe withdrawal symptoms in heavily dependent subjects.

Treatment forms an essential part of the services available for alcoholics, but falls short of being fully effective. Reports even from some of the best units show that although 60% of patients have worthwhile improvement, there is a high relapse rate – so that 40% of patients will receive little or no benefit. Unfortunately treatment services are often fragmented and unco-ordinated, which can hinder the early identification of the problem drinker.

### **Drug abuse**

The much publicized drug scene in Britain from the mid-1960s to the early 1970s coincided with a period of changing moral values amongst the young which alienated their elders.

Similar drug cultures developed in many other Western countries and were characterized by young people using both the established drugs such as hypnotics and central nervous system (CNS) stimulants, as well as experimenting with newer drugs. More men than women were involved, though the numbers of women who were dependent increased. Alcohol consumption also increased and many people have multiple dependency.

Now no longer a major focus of media attention (except for glue sniffing), the casual observer might be forgiven for presuming that the problem had receded or even disappeared. This is not the case. Although good evidence is hard to obtain, few who study the problem would deny that there has been a gradual increase in drug abuse. Certainly a wider selection of drugs is available and there have been changes in fashions of use. Moreover, whilst in the 1960s attention was directed to drugs other than the socially acceptable alcohol and tobacco, more recently there has been a greater awareness of the problem of excessive alcohol consumption.

### *Size of the problem*

Estimates of the number of drug users in Britain must be made with caution: the numbers known to the authorities represent people convicted of drug-related offences, which is likely to be a gross underestimate of the total number of drug users. Studies of the prevalence of

drug abuse in communities both in Britain and the United States have demonstrated that the 'true' frequency may be ten times that shown by official statistics and a very high proportion of the population may take drugs occasionally. Members of some professional groups such as doctors and pharmacists have a higher than average rate of dependency, a feature of their ease of access to supplies.

### *Drug dependence*

The World Health Organization (WHO) defines dependence as 'a state psychological and sometimes also physical resulting from the interaction between a living organism and a drug characterized by behavioural and other responses that always include a compulsion to take the drug on a continuous or periodic basis in order to experience its psychic effects and sometimes avoid the discomfort of its absence'. Tolerance may or may not be present.

A WHO expert committee on drug dependence also defined a number of groups of drugs which produce dependence and the ones which are commonly met with in Britain are considered here. There is considerable evidence that an individual may be dependent on more than one substance. The person who takes cannabis also often smokes cigarettes and drinks alcohol.

A number of theories have been put forward to explain the underlying cause of drug dependency. It is suggested that it might be some inherent defect of the individual's character, a symptom of deviant behaviour or a reaction to stressful situations. It may be the result of a psychiatric disorder such as depression or anxiety state, or a desire to conform with standards set by peers. It may be part of a rejection of conventional norms or have some physical basis by way of metabolic disturbances. Irrespective of how valid any of these hypotheses may be it is most unlikely that the cause of drug dependence is multiple and complex and involves the characteristics of the individual, his environment and the drug itself<sup>10</sup>.

*Morphine-type dependence.* The morphine-type drugs include opium, semi-synthetic derivatives such as heroin and codeine, and synthetic substances such as methadone and pethidine. These drugs are analgesics, with psychological effects such as alteration of mood, and can produce tolerance and dependency: withdrawal symptoms may be severe. Opium has played a major therapeutic role in the treatment of dysentery and the relief of pain. Smoking of opium has been practised in China from ancient times and there is a long history of attempts to regulate its production and supply. Abuse of narcotics is a major health problem in many countries, particularly the Far and Near East and America. At present it is not a serious problem in Britain, although

it has steadily increased during the 1970s. The number of adults known to the Home Office as being addicted to narcotics in England increased from approximately 1500 in 1972 to over 2000 by the end of the 1970s. The use of narcotic drugs has spread to new groups: a third of notified addicts were under 25 years and three-quarters under 30 years of age. A proportion of them became addicts because of earlier therapeutic treatment with these drugs. However, as stressed earlier these figures are probably a gross underestimate.

The individual user becomes malnourished, neglects himself and frequently develops infections at the site of injection and may contract serum hepatitis. The fatality rate is about 30 per 1000 of narcotic drug users each year in the UK.

*Barbiturate-type dependence.* Many older people are accustomed to taking barbiturate tablets to help them sleep. Over recent years doctors have been persuaded, with some measure of success, to reduce prescription of barbiturates and substitute other less habit-forming hypnotic drugs. However, it is probable that there has been an increase in barbiturate abuse by young people who often accentuate its effect by injecting it intravenously ('mainlining').

#### *Amphetamines*

Amphetamines ('speed') and similar stimulant drugs have been widely used by young people as pep-pills. It is probable that their use has decreased in recent years following the success of the campaign to reduce the prescribing of amphetamines by doctors, although they may still be contained in some prescribed appetite suppressants.

#### *Cocaine*

This drug also acts as a stimulant. It is not thought to be a serious problem in Britain as yet, but is commonly abused in the United States, particularly amongst more affluent people. The route of administration is usually by nasal inhalation (sniffing).

#### *Hallucinogenic drugs*

Hallucinogenic (psychedelic) drugs were a major source of interest during the 1960s when their ability to lead to altered states of perception led to them being an integral part of the youth culture. Many will remember their principal exponent, Timothy Leary's, celebrated phrase: 'turn on, tune in, drop out'.

The best known is the synthetic drug LSD (lysergic acid diethylamine), and mescaline is another example. This group of drugs causes an altered state of perception which may involve hallucinations and delusions. The individual can deliberately harm himself or others,



though in practice this happens only infrequently, because like other drug-taking it occurs in groups where not all members are actively taking it at the same time. It is probable that the problem has lessened in the UK. LSD has no major therapeutic value and it is relatively easy to synthesize. In some people a recurrence of symptoms may occur some months after taking LSD ('flashback') and it has been suggested that this is the result of permanent cerebral injury, but this has not been confirmed. Tolerance is developed so that a 'trip' cannot be repeated in the next 3 or 4 days.

### *Cannabis*

Cannabis ('marijuana', 'pot', 'grass', Indian hemp, 'hashish'), whose active ingredient is an extract of the flowers and leaves of a plant known as *Cannabis sativa*, is not a new discovery. Known for 2000 years it was brought into Europe during the Napoleonic Wars becoming, at the time, fashionable with influential authors. Many young people today experiment with it and others use it for social pleasure much in the same way as alcohol is used. The authorities of a number of countries have examined the problem in great detail and have come to largely the same conclusion: cannabis is a mood altering drug which does not cause dependence or aggressive anti-social behaviour. There is no firm evidence that it causes cerebral damage. It is widely used in many countries of the world and in Britain is probably increasingly used, though it is no longer in the news. This is in spite of penalties for its use, but there is no official suggestion in Britain that restrictions should be removed at the present time. It has been suggested that the use of this 'soft' drug can lead to 'hard' drug abuse, but firm evidence is difficult to come by. Recently a therapeutic role has been suggested for the drug in the treatment of patients in the terminal phases of diseases like cancer.

### *Glue and solvent sniffing*

The inhalation of vapours from glue and other volatile solvents (e.g. paint thinners, nail varnish remover, cigarette-lighter fuel, deodorants, typewriter eraser fluid) is a solitary or group activity largely confined to young adolescents, particularly males aged 13-16 years. It does not lead to true addiction and few persist with the habit into adulthood. It is difficult to gauge the size of the problem. Glue or solvent sniffing produces mood enhancement, sometimes accompanied by hallucinations which last for about 10-15 minutes. The behavioural signs in young people are similar to those produced in misuse of other drugs: aggression and irritation, poor performance at school or work and secretive and deceitful characteristics. Physical signs such as anorexia, vomiting, skin rash, irritation of the eyes or nasal passages may occur

in children who are frequent abusers. It often arises through boredom or curiosity, although sub-cultural and peer-group pressures may be important as they are with misuse of other drugs and cigarette smoking. The main dangers arise when the young person is intoxicated with the substance and may indulge in behaviour which results in accidental injury or death. Sudden death may result from cardiac arrhythmia due to toxic effects.

### *Prevention of drug abuse*

Action for prevention should be viewed in the wider framework of alcohol, cigarette smoking, and the prescribing of dangerous drugs. As far as possible it is necessary to keep the supply of dangerous substances under control. Health education has an important part to play, but is a long-term procedure and behavioural changes occur slowly.

Some believe in much more rigorous control and point out that no-one can use a drug if it is not available. The difficulty in restricting the supply is that advances in pharmacology have produced an ever increasing variety of drugs, an important factor in the spread of drug abuse, particularly with psychotropic drugs. The main barriers to prevention are the lack of knowledge about the natural history of dependence on drugs or the reasons why misuse occurs, and the fact that the prevalence of drug dependence is not accurately known.

Given these limitations four strategies of prevention can be tried:

- (a) education, especially those at high risk and to doctors to alter prescribing habits;
- (b) control of drugs, to make them less available;
- (c) legal penalties to discourage misuse;
- (d) treatment of established addicts.

### *Treatment*

There are a number of centres for the treatment of drug addicts in the large urban areas: some 15 centres in London and 21 in the provinces. They are run usually on an out-patient basis within the NHS and headed by a consultant psychiatrist who will also have access to in-patient treatment facilities if he judges it to be necessary. Attachment of social workers to such clinics often occurs and this provides a link between the health and social services.

The main aim of treatment is the gradual withdrawal of drugs under medical supervision. Various approaches have been tried including calculated withdrawal during an in-patient admission, persuasion, the substitution of a less damaging drug, help with personal problems and general social support. The method used will vary with the addict and the policy of the individual centre, but will often involve a combination

of these approaches. However, the relapse rate is high and continued support is essential. Aside from statutory provisions many such maintenance schemes are based on the self-supportive community concept adopted by the Alcoholics Anonymous or in houses or hostels run by voluntary organizations.

### *International control of drug use*

International control of drugs has been particularly directed towards narcotics. This was formally established following the Shanghai convention in 1909 and involved most major nations. The responsibility now is vested in the United Nations, who have to ensure that the member nations introduce laws to control the production, distribution and internal trade in drugs. They are also expected to keep precise records and to ensure that certain drugs are given only on doctors' prescriptions. The central objective is to control and curtail the use of drugs rather than to attempt prohibition.

### *Control of drugs in Britain*

The main legal provisions for the control of drugs in Britain are contained in the Misuse of Drugs Act 1971. The Home Office is responsible for the control of drugs. It keeps registers of addicts, maintains statistics of drug use and works with the police in stopping the illegal production and traffic of drugs. An Advisory Council on the Misuse of Drugs lays down conditions governing the control, import and export, manufacture, supply and possession. Legal provision is also made for the notification of drug addicts and on the prescription of restricted quantities of drugs to such addicts. The police have powers of entry and search in certain cases.

## **TRENDS IN THE CARE OF MENTALLY ILL PEOPLE**

### **Early practices**

In the Dark and Middle Ages the treatment of mental illness was governed by ignorance and superstition. If the mentally ill had delusions of a religious nature they were often revered; if their utterances were blasphemous they were held to be possessed by demons and treated in the first instance by exorcism by the priest. If this was unsuccessful then they would be subjected to physical restraint, pain and degradation. This quasi-religious view of mental illness gave way later to the notion that insane people were practitioners of the Black Arts. In Britain alone thousands of women and children were subjected to the ducking stool or burnt at the stake as witches; the last woman to meet her death in this way did so in Scotland in 1722.

**Britain in the eighteenth and nineteenth centuries**

In the early years of the eighteenth century, a number of singularly unpleasant fates could also befall the person who was mentally ill, depending on the circumstances in which he found himself. There was, then, no organized service to provide care for the mentally ill.

*The pauper lunatic*

If the manifestations of his illness led him into the trap of poverty, the pauper lunatic became subject to the conditions of the Poor Law. Under the old Poor Law, which dated from Elizabethan times, the responsibility for paupers rested with individual parishes, each of which had an overseer who raised money by taxation to provide for them. The standard of poorhouses provided varied greatly from one part of the country to another, but in many of the larger cities the workhouse began to emerge as the principal type of provision. A report by the Poor Law Commissioners which gave rise to the Poor Law Amendment Act 1834 saw that the workhouse had become the fulcrum of the State's policy on the poor. There was almost an obsession on the part of the authorities to prevent exploitation by malingerers. The workhouse with its frugal, and in many cases inhuman, surroundings was seen as the way to deter the lazy and the work-shy and to extract the maximum productivity from the able-bodied pauper. The policy on the pauper lunatic was to expressly exclude him from the workhouse; nevertheless, the majority found their way into it although they were not recognized or treated as a separate category. The law dealt with the vagrant very strictly and thus the mentally ill who left their own homes to wander abroad as beggars would often find themselves in prison. Similarly, criminal insanity was not recognized, thus if a person's mental condition led him to commit a crime he would be judged by penal law and usually find himself in the already crowded prisons.

Because of the deep shame attached to mental illness many families of poor and well-to-do alike sought to conceal its presence amongst their relatives. This led to the practice of keeping 'single lunatics' in remote places: it was not uncommon for a family member to be secured in a cellar like an animal for years at a time.

*The private madhouse*

For the wealthy, though escaping the indignity of the workhouse or the prison cell, insanity brought confinement in one of the private madhouses which proliferated in England at the time. These were run for profit and the fate of their inmates was scarcely better and in many cases worse than that of the pauper lunatic in the workhouse: shackling and deliberate ill-treatment was often the order of the day.

### *Bedlam*

Originally founded in 1247 as a priory by the Order of St Mary of Bethlehem, Bethlehem Royal Hospital in London was the largest and for some time one of the only public hospitals in England devoted to the care of the insane; it existed largely on public subscriptions. The treatment meted out to inmates was as harsh as that in the private madhouses. The mentally ill were chained in confined surroundings and often subjected to bizarre and whimsical therapies such as bleeding, purging or the induction of vomiting. Towards the end of the eighteenth century the general public could be admitted to the hospital and for the fee of one penny amuse themselves by watching the antics of the inmates. The name of the hospital, corrupted in common parlance to 'Bedlam', gave the English language a new word which was synonymous with mindless disorder and chaos. Discharged patients were given badges to allow them legitimately to exist as beggars without falling foul of the harsh vagrancy laws of the time. These 'Toms o'Bedlam' soon found their ranks swelled by imposters who had forged their badges.

### *The humanitarian movement*

At the beginning of the nineteenth century, concern began to grow amongst a few enlightened reformers and to a lesser extent by public opinion about the appalling way in which the mentally ill were treated. In part this came about through the existence of islands of compassion in the approach to mental illness. Outstanding in this respect was William Tuke, a Quaker, who founded the Retreat at York where the mentally ill were not manacled and restrained, but treated humanely. The success of this venture made a deep impression on attitudes to mental illness and its treatment.

Equally important were the revelations made by various select parliamentary committees of the circumstances of those housed in public asylums and private madhouses. One of the most well-known examples is the visit made by Edward Wakefield, MP and his colleagues to Bethlehem Hospital. During their visit they discovered one of the inmates, William Norris, who was half naked and chained to the wall in such a way that he could stand up or lie down but not sit. This wretched man had been kept in this way for nine years and by the time he became a *cause celebre* was in the terminal phase of tuberculosis. Similar discoveries of conditions in private madhouses led to legislation bringing them under licence, although it must be admitted that conditions changed little at first. Another important advance was the County Asylums Act 1808 which recommended that local authorities should build asylums to provide treatment for the mentally ill. The programme was not compulsory and thus implementation was very

slow in most parts of the country, but it was designed to cater mainly for the pauper lunatic who would otherwise have found himself in the workhouse.

Under the Madhouse Act 1828 (with subsequent amendments), the Metropolitan Commissioners in Lunacy, consisting of medical practitioners, barristers and lay people appointed by the Lord Chancellor, became the guardians of insane patients (in some of the places in which they were kept) and made reports.

The culmination of the reform movement was the passing by Parliament of the Lunatics Act 1845. In it the power of the Lunacy Commissioners was greatly extended so that they were responsible for inspection, licensing and reporting on all places in which the mentally ill were housed or cared for. They were able to investigate and report the circumstances of the mentally ill in prisons and workhouses (which had previously been outside their jurisdiction), as well as in public hospitals, asylums, private madhouses and other licensed premises. Further measures introduced in the Act were the tightening up of procedures for certification of the mentally ill and the compulsory keeping of records by institutions treating them.

### **Psychiatric hospitals and community care in the twentieth century**

#### *The open door policy*

During the early years of the twentieth century, the mental hospital, closed and often situated in a remote locality, served a predominantly custodial role with little attempt to treat mental illness or to forge links with the community. One of the first rays of light on this depressing scene was the widespread establishment of psychiatric out-patient clinics, which together with the move towards voluntary admission, were by-products of the enlightened Mental Treatment Act 1930.

In 1948 mental hospitals, along with other types of hospital, became part of the National Health Service and were no longer the responsibility of the local authorities. The local authorities were given statutory responsibilities for providing community care, which comprised care and after-care as well as prevention.

Most of the hospital facilities for the mentally ill inherited by the National Health Service were in buildings erected during the last century or even earlier. These large mental hospitals had been designed to provide an isolated self-sufficient community, often enclosed by high walls with the objectives of protecting society from the patient and of protecting the patient from the outside world. Few new mental hospitals had been built from the start of World War II so that serious overcrowding of existing hospitals reached crisis point by the mid-1950s. For instance, a typical large hospital designed to accommo-

date 1800 patients might contain 2700, be serving a catchment population of about one million made up of four or five different local authorities, and be staffed by three consultant psychiatrists. Thus serious thought was being given to the idea of building new hospitals. The discovery of the psychotropic drugs, which helped to accelerate a trend to reduction of psychiatric hospital inpatients (open door policy), arrested this development. A similar picture was seen in the USA and other countries (see Figure 7.10). This more optimistic outlook in treatment led to changing attitudes to mental illness amongst professionals and public: locked doors were opened and many more patients left hospital to live in the community, where local authorities began to provide an increasing quantity of supportive services.

In a way, the Mental Health Act 1959 served as the legislature's imprimatur on a wagon that was already rolling. In a relatively short space of time the mantle of isolationism fell away from mental hospitals and a real working partnership sprang up between hospital and community services. It was as if a latter day Joshua had blown his trumpet and the high walls around the mental hospitals had fallen down.

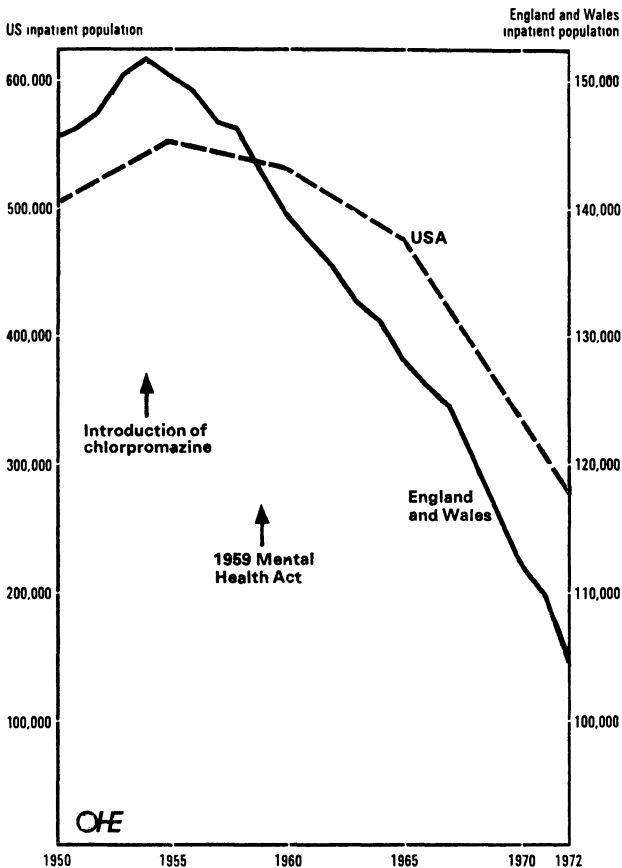
The population of mental hospital inpatients reached a peak in England and Wales in 1954 at just over 152 000 (3.4 per 1000 population), but by 1971 this figure had been reduced to almost 110 000 (2.3 per 1000 population), and the number had further declined by 1977.

From before the beginning of this century until the end of the Second World War, there was a slow increase in the number of admissions to mental illness hospitals and units. From the late 1940s until the early 1970s there was an increase in annual admissions from around 25 000 to about 160 000 (see Figure 7.11). During the course of the 1970s, admission rates remained stable, varying only slightly in an upwards or downwards direction. However, particularly during the early years of the 1970s, the ratio of readmissions to first admissions (patients who had not previously been in hospital) increased.

These trends undoubtedly reflect a change in admission practice with patients now staying in hospitals for short spells (the so-called 'revolving door' policy) and probably also an increased willingness on the part of the public to accept psychiatric treatment. It is unlikely that it represents a major increase in the frequency of mental illness.

### *The future of the large mental hospital*

These trends were recognized in the 1962 Hospital Plan which, under the stewardship of the Minister of Health, Mr Enoch Powell, proposed the rapid phasing out of the large mental hospitals. The treatment and care of the mentally ill was seen as being shared between psychiatric units in district general hospitals and community services, largely

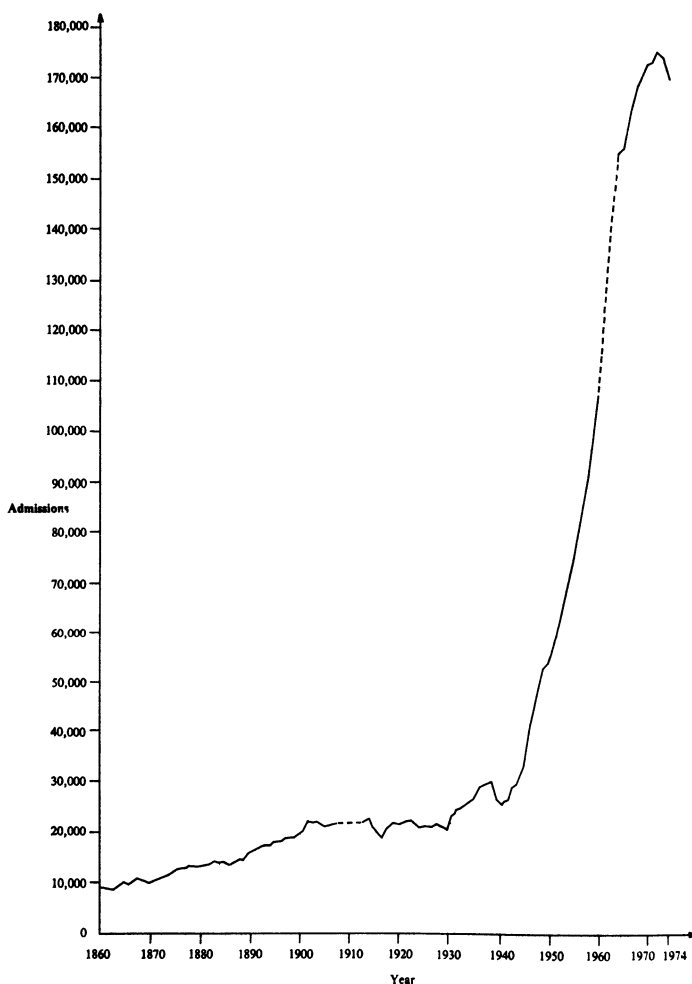


**Figure 7.10** Mental illness hospitals and units (England and Wales, inpatient population 1950–72, and US county mental hospitals, inpatient population 1950–72. Source: Office of Health Economics (1975). *Medicines which Affect the Mind*. (London: OHE)

provided by the local authorities. This is still the main plank of government policy on the mentally ill although its distance from reality was acknowledged in the White Paper, *Better Services for the Mentally Ill* (1975):

While there are many general hospital units already in being, probably only a third are of adequate size or offer standards of facilities for both day and inpatients capable of providing the focus of a full district service . . . individual local authorities are developing a wider range of day and residential services for the mentally ill but some still have no facilities at all; and nationally the total level of provision falls far short of the guideline figures.





**Figure 7.11** Estimated number of admissions to mental illness hospitals and units in England, 1860–1974. Source: Department of Health and Social Security (1977). *Inpatient Statistics for the Mental Health Enquiry for England 1974*. (London: HMSO)

The proposed phasing out of the large mental hospital with the consequent growth in psychiatric units in general hospitals and community services raises some important problems.

*The old long-stay patient.* At the time of the census of mental illness hospitals in England and Wales in 1971, 72% of beds were occupied by

patients who had been in hospital for more than one year; 52% by those who had been in hospital for five or more years and 27% by patients resident for 20 or more years. Many of these patients entered hospital when admission and treatment policies were different from those of modern times, and for disorders which would not warrant admission today.

For these 'old long-stay' patients the hospital has been their only home for much of their adult lives and they have gradually grown old within it. One of the effects of prolonged hospitalization is to lead to the individual becoming reliant on the institution, apathetic towards the outside world, indifferent to being discharged from hospital and to accept the routines of hospital. The patient is sometimes referred to as being 'institutionalized'. This has been viewed in the literature as a process common to other 'total institutions' such as prisons, boarding schools and military camps. Such institutions rely on strict rules, regimentation and deference to authority in order to ensure their smooth running (i.e. for the convenience of staff rather than patients or inmates). In the process, however, their inmates may become dehumanized, lose dignity, self-esteem, independence and self-determination which are then difficult to restore when the time comes to consider discharge from the institution.

These issues have added further weight to the movement to abolish the large mental hospitals entirely. It must be remembered, however, that although the present 'old long-stay' population of British mental hospitals is a dwindling cohort, its reduction through death is a relatively slow process. To discharge these patients overnight into the community would indeed be a heartless act and many of them would undoubtedly find themselves homeless, on park benches or in prison cells. The establishment of sufficient and suitable alternative accommodation, to provide a protected environment in the community, is therefore an essential prerequisite to the discharge of old long-stay patients from mental hospitals. The fact that this does not exist on a large scale in many parts of the country is the principal reason for maintaining some of the existing mental hospital facilities.

*The new long-stay patient.* By definition the old long-stay group is a closed category: it is usually taken to mean anyone admitted before 1971, and thus their numbers will gradually dwindle. Another group of patients who have profound implications for the psychiatric services, however, are those who, despite the modern emphasis on short in-patient stay, are retained in hospital for longer than one year (the 'new long-stay' patients). Although this situation might be comparatively rare in the context of total admissions in a year, even a small proportion (say 2% per annum) retained would lead to a not inconsider-

able accumulation over the years. If the large mental hospitals are to be phased out, then suitable alternative accommodation also needs to be found for this new long-stay group. The type of care that they require will, of course, vary according to their condition and degree of incapacity; 'new long-stay' is not a diagnosis but merely a convenient way of highlighting the problem. Whilst the majority of new long-stay patients could probably be cared for in a protected environment outside the hospital setting, the nature of this accommodation appropriate to any individual (e.g. hostel, home, flat or lodgings) and the degree of supervision required (e.g. nursing care, warden-controlled, visiting social work support) will vary enormously according to the degree of mental and social impairment and family circumstances. Aside from the establishment of adequate residential accommodation outside hospital, the prevention of the development of a group who require long-term institutional care also depends on adequate and wide-ranging provision of community services. In many ways this is one of the keys to the success of the new approach to psychiatric care and the emergence of a sizeable new long-stay population would deal a bitter blow to attempts to break away from the old pattern of services.

### *The elderly mentally ill*

The increase in the proportion of very elderly people in the population has led to a greatly increasing demand for psychiatric services. The 'psychogeriatric problem' is one of the most intractable facing planners of services. The need for integration at all levels between hospital geriatric and psychiatric services, health and social services, hospital and community is perhaps greater in the care of the elderly mentally ill than any other group.

The extent of the problem and the main issues involved in addressing it are discussed in Chapter 8.

## **LEGISLATION AND THE MENTALLY ILL**

At the beginning of the present century, the basis of legislation for the mentally ill was the Lunacy Act 1890. In this Act, no distinction was made between mental illness and mental deficiency. The main failing of the 1890 Act was, however, that it was deeply entrenched in a legal framework. Asylums could only admit patients who had been certified and this was often performed only as a last resort. As a consequence, sufferers from mental illness were admitted only when the condition was severe and this served to enhance the stigma attached to mental illness in the mind of the public.

After the First World War gradually a greater proportion of patients were admitted to mental hospitals without compulsory procedures

being involved. This situation received legislative recognition in the Mental Treatment Act 1930, which had been preceded by a Royal Commission on Lunacy and Mental Disorder. Subsequently the proportion of voluntary admissions to mental hospitals continued to increase. Compulsory admissions remained essentially a judicial procedure, with the final decision being taken by a magistrate, and this situation continued until the Mental Health Act 1959 cleared the way for a more liberal approach. This Act was based on the report of a Royal Commission and embodied the basic principles of its recommendations which were that the mentally disordered should be treated in the same way as those suffering from physical illness and that compulsory admission and detention should be used as infrequently as possible. The procedures became a mainly medical rather than a judicial affair.

Subsequent legislation has removed much of the general provisions for the care and treatment of the mentally ill and handicapped; this has been incorporated in other Acts. The Mental Health Act 1983 consolidated the Mental Health Act 1959 as amended by the Mental Health (Amendment) Act 1982. It is principally concerned with the grounds for detaining patients in hospital or placing them under guardianship, and aims to improve patients' rights and the protection of staff in a variety of ways.

### **Terminology**

The 1983 Act consolidated all previous legislation affecting the mentally disordered and made certain amendments in the terminology introduced by the 1959 Act.

The generic term mental disorder embraces

- (a) mental illness
- (b) arrested or incomplete development of mind ('mental impairment' and 'severe mental impairment')
- (c) psychopathic disorder
- (d) any other disorder or disability of mind.

The Act defines 'mental impairment' and 'severe mental impairment' and psychological disorder, but does not define mental illness.

*Psychopathic disorder.* This means a persistent disorder or disability of mind (whether or not including significant impairment of intelligence) which results in abnormally aggressive or seriously irresponsible conduct of the part of the patient.

*Promiscuity or immoral behaviour, sexual deviancy or dependence on alcohol or drugs.* These are not by themselves regarded as mental disorders.

**Procedures for admission under the Mental Health Act 1983***Informal admission (Section 131)*

As the term implies, informal admission is the admission of patients to mental hospitals and similar institutions without any legal compulsion. It is by far the most common manner by which patients enter hospital; of 190 000 patients entering mental illness hospitals and units in England and Wales during 1976, over 88% were informal admissions.

*Compulsory admission*

The procedures which exist for compulsory admission of patients may be summarized as follows:

*Admission for assessment in cases of emergency (Section 4).* This emergency procedure allows a patient of any age to be detained for up to 72 hours where he or his relative refuse informal admission but it is deemed necessary, either for the patient's welfare or to protect others. An application is made by an approved social worker or the nearest relative of the patient. In addition a medical certificate is required, usually from a doctor who has previous knowledge of the patient. About 52% of all compulsory admissions fall under this section of the Mental Health Act. At the end of the period of detention the patient may be discharged, continue on an informal basis, or be further detained under Section 2 of the Mental Health Act.

*Admission for assessment (Section 2).* This allows the patient to be detained for up to 28 days for assessment or for assessment followed by medical treatment. Application is made by an approved social worker or the patient's nearest relative, and must be supported by two medical recommendations. One of the doctors must be approved by the Health Authority as a person with specialist experience in the diagnosis and treatment of mental disorder. Approximately 30% of all compulsory admissions fall into this category.

*Admission for treatment (Section 3).* A similar application procedure to that required for admission under Section 2 is used here, although the recommendation is for a six months' period of compulsory treatment. Under certain circumstances the patient may be discharged before the end of six months, or a further detention order may be procured. Only 3% of all compulsory admissions are under this section of the Act.

*Hospital and guardianship orders (Section 37).* This is an order made by a magistrate (or judge in a Crown Court) for compulsory treatment in hospital of a patient convicted of a criminal offence. In the case of

psychiatric disorder or mental impairment this applies only where treatment is likely to alleviate or prevent deterioration of the condition. It must be supported by two medical recommendations as under Section 2. About 5% of all compulsory admissions take place in this way.

*Other provisions for compulsory admission.* Other provisions for compulsory admission and detention are dealt with in the Mental Health Act 1983. These include emergency admissions involving the police, and concern prisoners, people under guardianship orders, and patients already resident in mental hospitals. Together these types of provision account for 9% of the total compulsory admissions.

In all, only 5% of patients in hospitals for the mentally ill and the mentally handicapped are detained compulsorily and less than 2% are under court order.

Less than 10% of people remanded in custody by the police are found to be suffering from mental disorder as defined by the Mental Health Act 1983. It would, however, be misleading to think that this is a true reflection of the proportion of psychologically disturbed people coming before the courts. Various surveys suggest that up to a third of prisoners have some form of mental disorder.

### **Discharge of patients compulsorily detained**

A number of people are authorized to discharge patients who are compulsorily detained, but it is most commonly undertaken by the responsible medical officer. The nearest relative also has certain rights. Special restrictions on discharge may be imposed by courts.

### *Mental Health Review Tribunal*

The basic function of the Mental Health Review Tribunal is to consider applications for discharge of those patients compulsorily detained in hospital or under guardianship orders and to ensure that no patient is detained compulsorily without good reasons. The appointment of members of the Mental Health Review Tribunal is the responsibility of the Lord Chancellor, and three categories of members (legal, medical, and lay) are recognized. A panel of members exists in each Regional Health Authority from which tribunals are formed to consider cases as necessary. Each tribunal comprises at least three members, one from each category, with the legal representative acting as chairman.

An application for discharge may be made by the patient himself, his next of kin, the Secretary of State or the Home Secretary, depending on the section of the Mental Health Act under which the patient is detained. A patient detained under Section 2 may apply to the tribunal within 14 days after admission; a patient detained under Section 3 may

apply once within the first six months, once within the second six months, and once every subsequent year, and a patient detained under Section 37 may apply once in the second six-month period, and once every following year. The tribunal interviews the patient and his relatives and may seek evidence from medical and other health professionals who are involved in the care of the patient. The verdict of the tribunal is communicated in writing to the patient.

### **Property of mentally ill patients**

The Court of Protection is responsible for the protection and management of the affairs and property of patients who are incapable because of mental disorder of managing and administering their own affairs, irrespective of where the patient may be living.

### **Scotland**

The Mental Health (Scotland) Act 1960 has been amended by the Mental Health (Scotland) (Amendment) Act 1983 along broadly similar lines to the Mental Health Act 1983. A Consolidated Act is contemplated, probably for 1984. Implementation of the new provisions is likely at some time in the latter half of 1984.

### **Mental Health Act Commission**

This is a special health authority set up by the 1983 Act. About 80 part-time members – commissioners – are appointed by the Secretary of State from the professions of medicine, nursing, social work and psychology, as well as lay members. The Commission has a wide brief. It can investigate complaints and keep under review all aspects of the care and welfare of detained patients. Second independent opinions can be given by medical members of the Commission or by doctors appointed by the Commission.

## **THE ORGANIZATION AND DELIVERY OF SERVICES FOR THE MENTALLY ILL**

The hospital-based approach to mental illness has contributed to the delay in adoption of the multi-disciplinary approach to treatment in Britain. In various parts of Europe and the USA, for example, community-based mental health programmes were well established in the 1960s. The basic concept is that the patient is part of an environment with which he may be out of balance. The re-instatement of the patient with disturbed personal relationships is part of a therapeutic exercise involving a number of disciplines, and specialist therapeutic teams, which include psychiatrists, nurses, social workers, psychologists, occupational and recreational therapists, are now an accepted part of the approach to treatment in Britain.

Services for the mentally ill are currently organized around NHS hospitals and a wide range of community services, both residential and

non-residential, mainly provided by the local authority social services departments and voluntary agencies. The main components of care as they presently exist are described.

### **Hospital inpatient and outpatient services**

#### *Psychiatric units in district general hospitals*

These units are envisaged as the central element in the care of mentally ill people in the future. Ultimately it is intended that each district general hospital (DGH) would have a psychiatric unit which would provide the focus for specialist treatment of psychiatric illness in the health district. The unit would have sufficient beds to admit all new referrals and re-admissions of adults with mental illness. In addition, it would take responsibility for treatment of the elderly with functional mental disorder and the small number of very disturbed patients dealt with under compulsory admission procedures. Elderly people with dementia would not normally be admitted. The DGH unit is seen as having, in addition to inpatient beds, day-hospital facilities and psychiatric outpatient clinics. The latter would, as far as possible, be located with other outpatient facilities (e.g. general medicine, surgery) within the hospital. The emphasis in the DGH psychiatric unit is on early assessment, treatment and rehabilitation and thus on short stay and rapid turnover. As such it is very dependent on the existence of adequate provision of community services for patients who are being discharged.

There is an increasing number of psychiatric units as more district general hospitals become operational. Since the older large mental hospitals are still in existence in many places the two types of facility have to co-exist. Usually consultant psychiatrists work in both locations.

#### *The large mental hospitals*

The dilemma facing many authorities is how best to proceed with their existing large mental hospital accommodation, often in need of urgent upgrading, when the long-term fate of these hospitals is obsolescence. As has already been discussed, the barriers to phasing out these hospitals in many areas include the size of the present old long-stay population together with lack of an appropriate alternative setting for their care; insufficient community services to prevent accumulation of new long-stay patients within the hospitals, and insufficient resources to develop the DGH psychiatric unit.

The function of the large mental hospital therefore varies, depending on what other facilities are available in a district. Where both types of facility exist, the DGH psychiatric unit tends to deal with acute psychi-



atric episodes whilst the large mental hospital caters for those who require longer-term care. The danger inherent in this arrangement is that the large mental hospital comes to be regarded as the lower tier in a two-tier system of care. There is a consequent increase in the stigma of the long-stay hospital and difficulties with maintaining staff morale and of obtaining new staff recruits of high calibre.

Where districts have no DGH unit, the large mental hospital has acute wards to which patients are initially admitted, as well as longer-stay wards which house chronic patients, mainly of the old long-stay type but also the smaller number who are not judged suitable for discharge from the acute ward.

Traditionally the large mental hospitals encompass three main environments: the wards, the hospital workshop and the recreational areas. Over the years extensive upgrading has taken place in the old mental hospitals to provide patients with facilities for storing their clothes and personal possessions and so preserve their dignity. In addition, patients are allocated to wards on the basis of behaviour patterns and on the amount of supervision required, rather than by psychiatric diagnosis. Elderly patients are usually located on a ground-floor ward with easy access to the outside. It is customary to maintain a higher staff-patient ratio on the wards with the more disturbed patients. There is a less rigid separation of the sexes than in the past which from time to time is criticized because of fears of increased promiscuity. The hospital workshops undertake contracts from outside firms. Some patients also help with services within hospital such as catering or works and maintenance. The idea of a therapeutic community has been developed in many hospitals: doctors, nurses and other staff join the patients in group therapy, planning treatment, organizing social life and recreational activities.

Many large mental illness hospitals divide or sectorize their catchment area. The purpose of sectorization is that a specialist psychiatric team can relate to the community services for a defined area which matches with the area served by the related local authority social services or community nursing services. One large hospital could have two, three or four such teams.

The recent status of the large mental hospitals is perhaps best summarized by a further quotation from the 1975 White Paper, 'Better Services for the Mentally Ill':

Specialist care is still mainly based in large geographically isolated mental hospitals nearly all dating from the last century and designed for custodial care. Their outward appearance is often forbidding. Staff levels are often less than adequate. The equivalent of 835 full time consultant psychiatrists share clinical responsibility for 250 000 adult in-patients each year, over half a million out-patient attendances and more than two million day-patient

attendances. Their numbers are moreover unevenly distributed throughout the country. Nurses and other professional staff often have similarly daunting responsibilities. Basic facilities and amenities are often lacking. At the last count in 1974 more than 24 000 patients did not have full personal clothing of their own and many did not have a cupboard in which to hang their clothes. A number of large hospitals were still below the minimum standards for domestic staffing set by the DHSS for achievement by March 1973.

### *Secure accommodation*

In the early 1960s, hospital authorities were recommended either to provide regional units or to make special provision in each hospital for patients with serious and continuous behavioural disturbances who might be considered a danger to the public. Most regions took the second option, so there are relatively few regional secure units and the provision in each mental hospital has not been a particular success.

Special hospitals provide accommodation for dangerous and violent patients with criminal propensities. These hospitals were previously administered by the Home Office but are now the responsibility of the DHSS. However, accommodation is very overcrowded and the new provisions are urgently required.

### **Day-care services**

There are two main types of day-care service provided for the mentally ill: day hospitals provided by the National Health Service and day centres provided by the local authority social services department. In some places additional day care is provided by voluntary organizations concerned with the needs of mentally ill people (e.g. MIND).

### *Day hospitals*

About three-quarters of all day services for the mentally ill are provided by Health Authorities in day hospitals. The majority are located with existing hospitals, either in DGH psychiatric unit complexes (where these exist) or in the grounds of large mental hospitals. Patients will usually be referred to the day hospital by a psychiatrist or less commonly a general practitioner. About half of those attending live at home. Although the staffing of the day hospital is on a multidisciplinary basis it tends to have a medical rather than a social orientation. In addition to occupational and diversional activities (packing, sorting, dressmaking, painting), active assessment, treatment and rehabilitation are integral features.

It should be remembered, however, that patients often become 'chronic' attenders even in the day hospital setting and the numbers that have been attending for longer than one year will gradually accumulate over time.

### *Day centres*

Unlike the day hospital, the day centre (of which there are far fewer) does not form part of a large hospital unit either in the DGH or the large mental hospital. It is administered and run by the local authority social services department. Patients (or clients as they tend to be classed in this context) sleep at home and visit the centre each day to engage in a range of pursuits whose ultimate goal, through relearning and rehabilitation, is to restore them to normal life and work in the community. Such activities might include games (cards, table tennis), education classes, craftwork or group discussion sessions. The day centre has a social work rather than a medical orientation: no facilities for medical assessment or treatment exist. Clients are usually referred to the centre by special workers rather than doctors and in some cases this may be to provide temporary relief for a family caring for a mentally ill relative. In practice, the types of cases treated in a day centre may differ little from those attending a day hospital and a proportion will become chronic attenders. Centres vary in size from about 30 or 40 places to over 100 in large urban areas. Some local authorities have successfully experimented with including mentally ill people with other groups, for example, the physically handicapped.

### **Residential care in the community**

The passing of the Mental Health Act 1959 placed the onus on local authorities to develop services for the psychiatric patient outside the mental hospital. Present policy with its emphasis on short stays in hospital places an even greater burden on these services, which in many parts of the country have not yet been adequately developed. A key role in the provision of community services is reserved for places which can provide a protected or supervised environment for those patients who do not require the services of the acute psychiatric hospital unit but are unable to maintain an independent life in their own home. The types of patients who fall into this category are wide-ranging: chronic schizophrenics whose level of incapacity would lead them to self-neglect; people with psychiatric illness plus other disabilities, e.g. deafness or blindness; people who have been recently discharged from the acute psychiatric unit but are not yet ready to return to their own home; elderly people suffering from dementia. Some of the types of residential care presently available outside hospital for people with psychiatric illness are described.

### *Hostels*

The traditional model of hostels for the mentally ill, provided by both local and health authorities, is a transitional protected environment for patients discharged from psychiatric units before they return to the

community. They are often referred to as 'half-way houses' and aim, through short-term care and rehabilitation, to allow the patient to move back to an independent existence in the community as soon as possible. The success of such transitional hostels depends greatly on the maintenance of rigid criteria for admission so that only patients judged suitable for rapid rehabilitation are admitted. Despite this, it is inevitable that certain patients will become dependent on hostel life and be very difficult to resettle in the community.

A different type of care is provided in long-stay hostels. Whether the responsibility of the health service or local authority, these aim to provide a sheltered, supervised environment for those unlikely to be able to maintain an independent existence in the community. Many of the discharged old long-stay mental illness hospital patients and a proportion of those who would otherwise become new long-stay patients find themselves in this setting. These hostels are usually small, with about 15 residents, each with his own bedroom.

### *Group homes*

This is a more recent innovation aimed at those patients who no longer have acute symptoms and although being chronically handicapped and often without families are nevertheless capable of a certain degree of self-care. Most of them will have spent a considerable length of time as hospital inpatients and the group-home setting allows them to live with four or five other ex-hospital patients in a state of supervised independence. Such residents shop, prepare their own food, and clean and do other household chores in their home, whilst receiving regular visits from a non-resident supervisor, with support from social workers, home-helps and voluntary workers.

### *Staffed homes*

Other types of staffed homes apart from hostels are provided for those patients who have spent some time in hospital but find it difficult to settle in the community or have lost relatives who cared for them.

### *Supervised lodgings*

For a number of years some local authorities have used the services of hand-picked sympathetic landladies to take an ex-patient as a lodger. Such boarding out schemes depend for their success on the careful selection of both suitable patients and landladies. A multidisciplinary case conference would usually select suitable patients for discharge into this type of accommodation and a social worker would then keep regular contact with both landlady and patient.

**Primary care services**

A substantial part of the workload of general practitioners is made up of patients presenting with psychiatric symptoms. The majority of these would fall into the category of neuroses and be managed by the general practitioner himself without recourse to specialist psychiatric opinion; the smaller number of patients with severe, intractable or psychotic symptoms would usually be referred to a psychiatrist. In addition to dealing with new episodes of mental illness, the general practitioner will have on his list psychiatric patients who have been treated by the specialist psychiatric services and require follow-up and after care. With the move towards larger group practices and the attachment of other professionals (such as home nurse, health visitor and social worker) the concept of a primary health care team has emerged. This multidisciplinary team is an essential element in the provision of community care for many of the chronic disorders like mental illness and to provide a bridge with specialist teams in the psychiatric hospital unit. The team is uniquely placed to detect mental illness in its early stages and to provide or co-ordinate support of the established cases in the community.

**Other community services***Community nursing*

Some hospitals have community psychiatric nursing services to follow up patients who are discharged from hospital in order to supervise drug therapy, look for signs of deterioration and provide advice and support to patient and family members. The concept has great potential, but unfortunately is in operation in only a few places in the country, in part because of difficulties of recruitment in psychiatric nursing generally.

*Social work*

The modern concept of the generic social worker who is capable of dealing with a wide range of problems led to considerable unease amongst general practitioners, who had in the past worked with the specialized Mental Welfare Officer who had responsibilities for statutory admissions under the 1959 Act. Whilst the concept of a generic social services department remains widespread, there is evidence of the development of special interests amongst both community and hospital-based social workers who may have specialized caseloads. Social work staff remain key elements in the care of the mentally ill, whether in the hospital, residential, primary care or community field-work settings. By establishing relationships with the patient and his relatives and gaining knowledge about the nature of his illness and his circumstances, the social worker can alleviate crises, assist in rehabilitation and mobilize support when necessary.

*The family*

Shifting the balance of care to the community means an increased load on the main caring resource – the family. More than any other group, the mentally ill present special problems which often constitute a major burden. This particularly affects close relatives – brothers, sisters, parents and children. The effects are seen in the considerable disruption of domestic life and the severe restriction of social pursuits. A discharged psychiatric patient can also affect the family work pattern and thus the family income.

**MENTALLY HANDICAPPED PEOPLE – DEFINITIONS**

Older terms for mentally handicapped people such as mentally deficient, idiot, imbecile and feeble-minded were superseded by the term mentally subnormal when the Mental Health Act 1959 became law. The Act defined two types of subnormality: severe subnormality and subnormality. The term ‘subnormal’ became unpopular and was replaced in general usage and official documents by the term ‘handicapped’, though the legal definitions remained in force. The definitions of subnormality according to the 1959 Act are:

Severe subnormality – means a state of arrested or incomplete development of the mind, which includes subnormality of intelligence, and is of a nature or degree that the patient is incapable of living an independent life or of guarding himself against serious exploitation or will be so incapable when of an age to do so.

Subnormality – means a state of arrested or incomplete development of mind (not amounting to severe subnormality) which includes subnormality of intelligence and is of a nature or degree which requires or is susceptible to medical treatment or other special care or training of the patient.

Thus, the definitions encompass subnormality of intelligence as well as the concept of social incapacity. An exact level of intelligence quotient (IQ) is not specified, but it is conventional to regard people with an IQ below 50 as severely mentally subnormal and those with an IQ between 50 and 70 as mentally subnormal. It cannot be over-emphasized that whilst IQ can be a useful diagnostic measure which is also administratively convenient, it is not a sufficient basis on which to assess the degree of mental handicap. Other factors such as stability of character, emotional and personal qualities, social and educational achievements, capacity for self-care and social functioning must also be taken into account. The term ‘mental subnormality’ is traditionally confined to those individuals who have been handicapped from a very early age (although not necessarily at birth). It excludes those who acquire mental handicap in later life, for example, the unfortunate

cases of permanent and severe mental handicap caused annually by road accidents.

Because mental illness and mental subnormality are both included in the generic term 'mental disorder' there is sometimes confusion between these two distinct conditions. It is perfectly possible, however, for the conditions to coexist: for example, a mentally handicapped adolescent may exhibit psychotic symptoms.

Under the Mental Health Act 1983 the term 'impairment' replaced 'subnormality' and new legal definitions were set out as follows:

Severe mental impairment – means a state of arrested or incomplete development of mind which includes severe impairment of intelligence and social functioning and is associated with abnormally aggressive or seriously irresponsible conduct on the part of the person concerned.

Mental impairment – means a state of arrested or incomplete development of mind (not amounting to severe mental impairment) which includes significant impairment of intelligence and social functioning and is associated with abnormally aggressive or seriously irresponsible conduct on the part of the person concerned.

By introducing the concept of 'abnormally aggressive and seriously irresponsible conduct' to the definition, many mentally handicapped people will be excluded from legal provisions, since they do not behave in a grossly abnormal manner.

## **AETIOLOGY OF MENTAL HANDICAP**

Mental handicap may occur where there is an identifiable underlying pathological process which leads to damage to the central nervous system, or it may be present in the absence of any demonstrable pathology. In general, most people with severe mental handicap (IQ <50) fall into the category in which there is underlying organic cause, whilst only a small proportion with mental handicap (IQ 50–70) can be explained in this way. In this latter group, their mild mental handicap is most often explained on multifactorial grounds, with subcultural factors such as low social class and adverse social circumstances playing a prominent role.

### **Organic causes**

The factors which may lead to disease, damage or abnormal development of the central nervous system in a way which will result in mental handicap are complex. Nevertheless, two important mechanisms are usually in operation: genetic and environmental.

*Genetic causes*

Mental impairment may result from the action of single adverse genes, but this cause is uncommon; more frequently it arises from the formation of abnormal chromosomes.

*Action of adverse genes.* Very many thousand genes are responsible for determining the detailed structure and function of the human body. In rare circumstances harmful genes, which may be transmitted by dominant, sex-linked or recessive inheritance, or arise spontaneously by mutation, can lead to abnormalities in the structure or function of the body. Well known examples outside the field of mental handicap are sickle-cell anaemia and achondroplasia (dwarfism). In addition there are important examples where mental handicap is a prominent feature due to damage or abnormal development of the brain. Such a disease is phenylketonuria.

*Phenylketonuria*, a rare recessively inherited condition (occurring in about one in 10 000 births in Britain) in which the absence of a specific enzyme leads to a failure in the ability of the body to convert the amino acid phenylalanine to tyrosine. Phenylalanine accumulates in the blood and tissues and has a toxic effect on the brain, leading to convulsions and (usually) severe mental handicap. The deficiency of tyrosine leads to paucity of melanin formation and thus lack of pigmentation giving rise to the other characteristics of the syndrome: blond hair, blue eyes, pale skin and a tendency to infantile eczema. The treatment is to eliminate phenylalanine from the diet until the CNS is mature. Since it is an essential amino acid this cannot be done completely, but if severe dietary restriction is instituted as early as possible there is a chance of limiting the degree of impairment resulting from the condition. This has led to the practice of screening all new-born babies by taking a few drops of blood and testing for excess phenylalanine (the Guthrie test).

Similar inherited enzyme defects can give rise to other syndromes where mental handicap is a feature. Genetically transmitted disorders associated with mental handicap are not restricted to those resulting in inborn errors of metabolism: epiloia or tuberous scleriosis (autosomal dominant) and neurofibromatosis (autosomal recessive) are other examples of disorders transmitted by single genes.

*Formation of abnormal chromosomes.* For some years it has been known that specific chromosomal abnormalities are associated with certain diseases. The nuclei of normal human cells contain 46 chromosomes made up of 23 pairs of chromosomes: one of each pair is derived from either parent. There are two types of chromosome, one pair which determine sex (sex chromosomes) and the other 22 pairs which



are called autosomes. Males have 44 autosomes, one X and one Y sex chromosomes; females have 44 autosomes and two X sex chromosomes. Chromosome abnormalities may involve either the sex chromosomes or the autosomes and may be due to abnormalities in chromosome number (more or less than the usual complement) or in their structure. Perhaps the commonest and best known example of a mentally-handicapping disorder arising from chromosomal abnormalities is Down's syndrome or mongolism.

*Down's syndrome* was first described and termed 'mongolian idiocy' in 1866 by Dr John Langdon Down of London. He also established Normansfield Hospital as a private institution for mentally handicapped people in 1873; this was later to become well-known as a result of a sharply critical report of a committee of enquiry in 1978. Langdon Down considered that the condition represented the regression to an earlier evolutionary form which resembled the oriental.

The physical characteristics of Down's syndrome (although each is not present in all cases) include narrow slanting eyes with prominent epicanthic folds; short stature; small ears; short broad neck; furrowing of the tongue and a tendency for the mouth to hang open; a single transverse palmar crease; prominent and characteristic skin ridges on the palms of the hand, fingers and soles of the feet. Congenital abnormalities of the heart and intestinal tract occur more frequently than in other infants.

Within the diagnosis of Down's syndrome there is a range of cognitive ability, but the IQ usually lies somewhere between 20 and 50 with a small proportion having an IQ greater than 50. People with Down's syndrome are usually described as humorous, cheerful and affectionate. Whilst it would be wrong to accept this as a stereotype, many people involved in the care of children with Down's syndrome would agree with this description of their personalities.

People with Down's syndrome always possess extra chromosomal material in the cells of their bodies. The presence of an extra discrete autosomal (i.e. non-sex) chromosome is called 'trisomy'. In 95% of cases of Down's syndrome, all or part of an extra chromosome resembling the normal number 21 pair of chromosomes is present in the cell; this most common variant of Down's syndrome is called 'trisomy 21'. It arises because of a failure of separation of chromosomes (non-disjunction) during cell division in the formation of the ovum: the fetus developing from this ovum, when it is fertilized, has 47 chromosomes rather than the usual 46. In a less common form of Down's syndrome the extra chromosomal material becomes joined to another chromosome: the so-called translocation type. In a third rare form, non-disjunction occurs after fertilization so that only some of

the cells of the body are abnormal (mosaicism).

The incidence of Down's syndrome is of the order of 1 in 800 live births. The precise aetiology of Down's syndrome is unknown, but the most striking feature is the strongly increased risk of trisomy 21 with increased maternal age. Recent trends towards earlier childbearing have led to a fall in the crude incidence of Down's syndrome live births. However, despite this falling incidence, the prevalence of the condition has risen over the same period of time. This is because life expectancy for the person with Down's syndrome has greatly improved. In the past many died in childhood and few survived beyond early adulthood, succumbing to infection; today, because of improvements in general living standards and advances in medical care a high proportion survive into adult life and older age. This, of course, has implications for provision of services.

### *Environmental factors*

A wide range of factors in the environment can produce permanent cerebral damage which can lead to mental handicap. These factors can be conveniently grouped in accordance with their relationship to the pregnancy.

*During intrauterine life.* Between the time of conception and birth, the growing and developing fetus is protected within the maternal womb and nourished by the placental circulation. At the same time it is at the mercy of the adverse environmental factors to which the mother is exposed. The best known recent example of the drastic repercussions of such a maternal exposure on the developing fetus was the story of the drug thalidomide. Similarly, other types of exposure to infections, or chemical or physical agents can result in damage to, or impaired development of, the fetus and some can affect the brain, leading to mental handicap.

*Infections.* Maternal exposure to rubella (German measles) virus, particularly during the first trimester of pregnancy, puts the developing fetus at risk of the congenital rubella syndrome. The manifestations include congenital heart disease, deafness, blindness and mental handicap. The disease is discussed in detail in Chapter 9 and the role of immunization in its prevention is discussed in Chapter 3. Other infections of the mother during pregnancy, in particular cytomegalovirus and toxoplasmosis, have been implicated in the causation of mental handicap in the offspring. Congenital syphilis, acquired by the mother and passed to the fetus, has long been recognized as a cause of mental handicap as part of a general multisystem disorder.

*Rhesus incompatibility.* There is a risk to the rhesus-positive fetus being carried by the rhesus-negative woman, if there has been mixing of the fetal and maternal blood during a previous rhesus-positive pregnancy. The mother may then produce antibodies against the baby's red blood cells. The resulting jaundice may produce cerebral damage (kernicterus) and result in cerebral palsy and mental handicap. The problem of rhesus incompatibility and its prevention is further discussed in Chapter 6.

*Exposure to radiation.* Excessive use of diagnostic X-rays in pregnancy has in the past led to the production of a mentally handicapped child. With the advent of ultrasonics this is a rare occurrence today.

*Alcohol intake in pregnancy.* The extent of the problem of mental handicap arising from consumption of alcohol during pregnancy has not yet been fully elucidated but it is likely to be a risk factor.

*At birth.* Two factors are of particular importance during the process of birth which may lead to injury of the brain and some degree of mental impairment: hypoxia and birth injury. Hypoxia (oxygen starvation) in the fetus may occur for a variety of reasons such as pre-eclamptic toxæmia, antepartum haemorrhage, anaesthetic complications, excessive sedation during labour, respiratory distress in the infant, pressure on the umbilical cord, or prolonged labour. Trauma during delivery is particularly likely to occur with abnormal presentation of the fetus or with instrumental delivery.

Fortunately, with modern obstetric care and the tendency towards early Caesarian section in difficult cases, birth trauma as a cause of mental handicap is much less common today than in the past. Prematurity with low birth weight is strongly associated with the later development of mental handicap. It is unlikely, however, that the relationship is one of cause and effect, but is probably explained by the fact that babies in this category are much more susceptible to adverse factors during delivery and afterwards.

*After birth.* A wide variety of elements of the post-natal environment may lead to cerebral damage and mental handicap. In the early post-natal period hypoglycaemia is a serious problem which, if uncorrected, can cause convulsions and cerebral injury. Some of the common infectious diseases of childhood, e.g. mumps, measles, and whooping cough, occasionally result in encephalitis and consequent long-term handicap. Rarer infections such as meningitis may also lead to permanent cerebral damage. Head injury, either accidental or deliberate (as part of the child-abuse syndrome), may have similar repercussions. One of

the effects of excessive exposure to inorganic lead, either as a result of pica (ingestion) or environmental pollution, is varying degrees of mental impairment.

### *Genetic and environmental factors*

In addition to the syndromes which have been described, other congenital disorders may result in mental handicap. For many of these the aetiology is not clear, but various genetic and environmental factors appear to be involved. Neural tube defects may fall into this category (see Chapter 6).

### **Non-organic causes**

Causes of mental handicap which are not associated with an underlying pathological process are usually classified as 'multifactorial' or 'sub-cultural'. In general these factors are important in the causation of mild mental handicap. The most striking feature of a comparison between the aetiologies of mild and severe mental handicap is the social class distribution of the two types. Severely mentally handicapped people are distributed equally amongst the social classes; amongst those who are mildly handicapped there is a strong aggregation in the lower social classes. The proportion of mildly handicapped people in Social Class V is nine times higher than that in Social Classes I, II and III (non-manual).

At one time it was considered that the strong correlation between low social class and mental handicap was mainly genetic in origin. In other

**Table 7.6 Differences between severe and mild mental handicap**

	<i>Severe</i>	<i>Mild</i>
IQ	Below 50	50-70
Social class distribution	Evenly distributed	Strongly aggregated in Social Class V
Prevalence	4 per 1000; almost all are in contact with services	10 per 1000; only $\frac{1}{3}$ are in contact with services
Education	School for ESN (S)	School for ESN (M), but many in ordinary schools
Employment	Most attend training centres; unsuitable for open employment	Majority in open employment, although in menial jobs
Physical handicap	High proportion have additional physical handicaps	Few have added physical handicap

words, there was a pool of people of low intelligence in the lower social classes who by marrying and reproducing mainly amongst their own kind perpetuated the pool. This interpretation is no longer widely held.

The influence of social and environmental factors is now viewed as important in the production of mild mental handicap. Women in the lower social class groups are more susceptible to complications of pregnancy and labour and are more likely to give birth, for example, to a low birth-weight baby with a consequent risk of impairment. Most importantly, an unstimulating home environment during childhood may impair the child's intellectual development to the extent that he falls into the category of mild mental handicap. Table 7.6 summarizes the main differences between mild and severe handicap.

### **MENTAL HANDICAP - THE SIZE OF THE PROBLEM**

An estimated one and a quarter million people, 3% of the population of the United Kingdom, have an IQ of less than 70, and about a tenth of this number will have an IQ below 50. But although just over a million people have IQs in the 50-70 range, only some 400 000 will have been classified as mentally handicapped because they have come to the notice of authorities, largely through educational or social difficulties. Thus there is a difference between administrative prevalence of mild mental handicap (i.e. those in contact with services at any one time) and its true prevalence (i.e. all people with mild handicap including those not in contact with services). This situation is inevitable since (taking the usual meaning of mild handicap) the upper end of the spectrum of mild handicap blends with the lower ability groups in the normal populations. This accounts for the fact that the prevalence of mild handicap increases with age during childhood: it becomes more apparent when the child advances and receives greater challenges in the educational system.

In contrast, most of those people with severe mental handicap, of whom there are an estimated 160 000 in Britain, because of the severity of their condition will have come to the attention of statutory authorities. In the case of severe mental handicap the administrative prevalence approaches the true prevalence. In addition, severely handicapped children will tend to present in early childhood. The proportion is higher in the younger age groups, but is reduced by higher infant mortality amongst mentally handicapped babies. The overall prevalence of severe mental handicap in childhood is between 3 and 5 per 1000 and Down's syndrome accounts for a third of this. About a third of the severely mentally impaired group have coexisting physical handicaps such as blindness, deafness, epilepsy or spasticity. There has been speculation over recent years as to whether the prevalence of

severe mental handicap has increased because of improved survival of affected infants. The prevalence has, in fact, remained remarkably stable. This is probably explained by the fact that although survival has improved there have also been improvements in obstetric and perinatal care, leading to a lowering in the incidence of severe handicap due to these causes.

### TRENDS IN THE CARE OF THE MENTALLY HANDICAPPED

References to idiots or 'born fools' are to be found in the earliest historical writings. Indeed, the word idiot derives from the Greek *Idiotés* which was used contemptuously to describe those who did not wish to pursue political office. From being a stigma of lack of ambition the word became degraded to mean low intellect. Yet, one of the biggest barriers to progress was the failure on the part of those responsible for providing services to recognize that mentally handicapped people were a group with special needs and in particular, a tendency to confuse the group with the mentally ill.

A celebrated incident in which specific attention was drawn to the subject of mental handicap was the discovery at the beginning of the nineteenth century in France of a wild boy found wandering in the woods of Aveyron. Attempts to educate 'Victor' by a course of planned instruction met with only limited success, but laid the foundation for the educational and training approach towards mental handicap.

In Britain during the nineteenth century the first Idiots Asylum was opened at Park House in Highgate in 1847; it later moved to Earlswood Common in Redhill. Similar voluntary institutions were soon opened elsewhere. Some of the early special schools for the handicapped were also called asylums. They were financed by voluntary subscriptions and provided an environment, isolated from the outside world, in which mentally handicapped were taught a trade to allow them to move (at a suitable age) into the sheltered workshop which was often a feature of the institution.

The Idiots Act 1886 and the introduction of special schools for all mentally defective children after the Elementary Education (Defective and Epileptic Children) Act 1899 aided the trends towards the recognition of the mentally handicapped as a group with special needs.

Attitudes to mental handicap in Victorian Britain were, however, far from enlightened. Figures in authority saw the feeble-minded as a potential criminal class with pronounced promiscuous tendencies. The holders of these moralistic views feared that the 'mentally deficient' might breed unchecked, multiplying their numbers and swamping the

normal population, leading to degeneracy; all this led for a time to the advocacy of sterilization and other controls on reproduction.

An important advance was the establishment of a Royal Commission on the care of the feeble-minded which was followed by the passing of the Mental Deficiency Act 1913. The Act set out to establish a special system of care for the mentally handicapped. It was set in a firm legal framework and recognized four categories of mental deficiency: idiots, imbeciles, feeble-minded persons, and moral imbeciles. Local authorities were charged with forming committees for the care of the mentally defective, ascertaining all mental defectives within their area, providing suitable supervision for mental defectives, and providing institutional accommodation where such supervision was not adequate. Although the 1913 Act represented a major step forward, it had flaws. The emphasis was on custodial care, protection of other members of the community and the control of further increase in the population of mental defectives by segregation. The underlying philosophy of the Act was tinged with the eugenics belief, which gained widespread acceptance through the writings of Galton (1822–1911), in maintaining a high quality of human offspring and reflected the contemporary view that the propagation of the unfit would lead to national degeneracy.

Between the World Wars an expansion of large ‘colonies’ for the mentally deficient, built in geographically remote areas, took place and the number of institutionalized people rose steeply. The large colony became the centre-piece of the service for the mentally handicapped and many of the buildings still remain, though the service is differently organized. The standard of organization, which lasted into the 1960s, was to have institutions with mixed grades of inmates. The high-grade inmates were the skilled workers. They carried out such tasks as engineering and maintenance work whilst the medium-grade inmates were the labourers working in the gardens, farms, laundry and kitchens, and even the low-grade inmates were found simple menial tasks.

The so-called ‘colony’ was run economically and was largely self-sufficient. In the period after the Second World War it was recognized that it was neither possible nor desirable to provide institutional care for all mentally handicapped people. The Royal Commission of 1954, which preceded the 1959 Mental Health Act, recognized (as it also did for the mentally ill) a need to shift the balance of care in the direction of community services. When a start was eventually made in discharging more suitable patients into the community, considerable apprehension was expressed by some of the senior medical and nursing staff. However, in spite of many years of institutionalization most settled well in open employment. One finding around this time was that about

a quarter of the females discharged had originally been committed to care for having an illegitimate child, a reflection of the eugenics approach.

The Mental Health Act 1959 envisaged that the majority of mentally handicapped people and their families would be supported in their own home by community services. These services provided by the local authority would include advice, education and training as required. Moreover, the Act dispensed with the old terms feeble-minded, idiot, imbecile, and moral imbecile, which by this time had become deeply stigmatizing and offensive. They were replaced by the terms mental subnormality and severe mental subnormality, which are defined in a previous section. The Act also removed the stigma of certification, but there was still much to be done.

The scandal over conditions at the Ely hospital in the late 1960s, in which mentally handicapped patients had been subjected to cruelty and physical ill-treatment, was a chilling echo of the past. The Government White Paper 'Better Services for the Mentally Handicapped' published in 1971 reiterated the policy commitment to community care and an integrated service. These goals were made easier to achieve by the establishment of social services departments in local government in 1971 and by reorganization of the National Health Service in 1974. The passing of the Education (Handicapped Children) Act 1970 transferred responsibility for the education of mentally handicapped children to the educational authorities. Children who were ineducable in accordance with the Education Act 1944 had previously been placed in junior training centres provided by local authority health departments. The concept of ineducability was removed from the legal framework by the 1970 Act, which placed responsibility on local education authorities for educating all children. Junior training centres became schools for educationally subnormal (severe) children (ESN(S)). This was not just an administrative exercise, but brought these schools into the main stream of educational as opposed to health provision. In the decade after 1970, the number of places available in ESN(S) schools increased by 50% and there was a major improvement in the number of qualified staff.

### **SERVICES FOR MENTALLY HANDICAPPED PEOPLE**

Three main statutory authorities provide care for mentally handicapped people: health, social services and education. In addition, services are provided by voluntary organizations. Services are co-ordinated formally through joint planning teams as well as informal contacts. About a third of the money used for joint financing (between NHS and social services) is for schemes connected with the mentally handicapped.



**Prevention (health provision)**

The principal elements in the approach to the prevention of mental handicap are summarized here and are dealt with in more detail elsewhere in the book.

- (a) Amniocentesis, e.g. Down's syndrome.
- (b) Genetic counselling.
- (c) Immunization, e.g. rubella.
- (d) Environmental surveillance, e.g. to reduce hazards such as lead.
- (e) Health education: adequate nutrition, early presentation for antenatal care; non-smoking and limited alcohol intake during pregnancy; optimum age range for child bearing.
- (f) Ensuring a high standard of obstetric care.

**Ascertainment and assessment (health and education provision)**

Assessment is of value only if it is backed up by adequate treatment, care and education facilities.

***At birth***

Over 90% of births occur in hospital and severely mentally handicapped children are usually identified when they have physical characteristics such as Down's syndrome by the paediatrician, obstetrician or midwife. Other conditions (e.g. phenylketonuria) are diagnosed by special tests.

***The pre-school child***

Mental handicap may be identified during routine development screening, either in the health authority clinics or by the primary care teams. The health visitor member of the primary care team regularly visits homes and is in a good position to measure the progress of the child. Multidisciplinary assessment centres have been established in various parts of the country, mostly within the curtilage of a general hospital. The professionals involved in the assessment include paediatricians, clinical medical officers, psychologists, social workers, speech and play therapists and teachers. Parents usually participate at some stage. The child may be brought in for sessions extending over a period of a few weeks, while some centres concentrate the assessment over two or three days. The general practitioner is informed of the results, as well as the parents and school medical officer. If the child is attending a nursery school, nursery class or playgroup, the teachers and playgroup leaders are in a special position to report on the child's progress.

***The schoolchild***

The assessment of children requiring special education requires reports

from the head teacher, educational psychologist and school doctors and a special form is used to record their separate contributions. Recommendations are then made for the correct educational placement of the child. These assessments involve the use of standard intelligence tests.

### *The school leaver*

For school leavers an assessment is made some time before the pupil leaves school. It should involve the head teacher, educational psychologist, careers officer and if appropriate the manager of the adult training centre, who decide on a suitable placement for the child.

## **Non-residential services**

### *Pre-school*

Most authorities now agree that all mentally handicapped people should be given some education and training and that this should be started early. In Britain, it is estimated that there are 12 000 children under the age of five years who are severely mentally handicapped and 300 000 who are mildly mentally handicapped.

A mentally handicapped child may attend an ordinary pre-school playgroup or a pre-school playgroup for mentally handicapped children. Unfortunately the latter facilities are very unevenly distributed; many parts of the country are either under-provided or have no facilities. A playgroup gives the child an opportunity of benefiting from contact with other children, as well as providing a period of relief to the mother.

Many local authorities give priority to handicapped children applying for admission to their day nurseries. Here the emphasis is on caring rather than education and few make special provision for the training needs of a mentally handicapped child. It does, of course, provide much needed relief to the mother. A few day nurseries have a permanent teacher on the staff appointed by the local education authority and seconded to the social services department.

A mentally handicapped child may sometimes be admitted to a nursery class in an ordinary school. This is usually at the discretion of the head teacher and often for a trial period. Problems often arise because of lack of staff to cope with the extra requirement needed for a handicapped child. An increasing number for the ESN(S) admit pre-school children.

### *Schoolchildren*

Educationally subnormal (ESN) was one of the categories identified by the Handicapped Pupils and Special School Regulation 1959 and is

there defined as 'children who are educationally retarded and require some form of special education in substitution for education normally given in ordinary schools'. This broad definition was originally applied to all backward children, making up about a million in all (over 10% of the school population), but nowadays the term educationally subnormal usually refers to children who actually attend an ESN school. Thus the number of ESN children is dependent on the level of educational provision. In that the provision of special schools varies in different parts of Britain there is a similar variation in the number of educationally subnormal children. About two-thirds of all special school places are for educationally subnormal children (90 000 in England and Wales) and this represents a three-fold increase since the early 1950s. These schools have a higher staff-pupil ratio and the teachers are specially trained. The schools are better equipped with support from speech therapists, psychologists and physiotherapists and special emphasis is placed on social training and language development. About 12% of children ascertained as educationally subnormal attend special classes in ordinary schools.

The very severely mentally handicapped children who often have severe physical handicaps are provided for in special care units within ESN(S) schools.

Special schools provided in hospitals for the mentally handicapped are the responsibility of the local education authority and are operated on similar lines to the ESN(S) schools. Most of the children attending are residents in hospital, but a few live nearby at home.

The Education Act 1981 changes the way in which the needs of handicapped children are met, and this is discussed in Chapter 6.

### *School leavers*

The school leaving age for ESN schools is 16 years, but recently there have been suggestions that it should be raised to 21 and more opportunity given for education in colleges of further education. The mentally handicapped school leaver also has a choice of open employment, employment rehabilitation centres, sheltered workshops, and adult training centres. Most of the leavers from ESN(M) schools find a placement in open employment, but this is very much the exception for leavers from ESN(S) schools where the majority go to adult training centres.

### *Adult training centres*

Most of these centres were purpose built and most of the trainees live at home. An increasing number of staff hold qualifications. Most centres have contract work of a simple nature, such as sorting, labelling and

packaging, which is subcontracted from local firms. The trainees are paid up to the amount which does not affect their social security payments. Training is also given in social skills. Although the work undertaken in many centres anticipates the kind of work available in local industries, very few trainees obtain places in open employment and even fewer in sheltered workshops. Adult training centres tend to become an end in themselves, rather than a means to an end. There were over 50 000 places in adult training centres in the UK by 1980, which reflected an increase of over one-third during the previous decade. In some parts of the country adult training centres have been renamed social education centres to reflect the extended syllabus provided.

### *Day units in hospitals*

Day units in hospital are similar to the adult training centres, but most of the trainees are hospital residents and the contract work undertaken reflects the local available industry.

### **Residential provision**

There has been a gradual decline over the last two decades in the proportion of the population who are in mental handicap hospitals and units. This has been marked since the beginning of the 1970s and the rate (per 100 000 population) has fallen more for children (from 53 in 1970 to 33 in 1977) than for adults. The White Paper 'Better Services for the Mentally Handicapped' envisaged that by 1991 hospital beds for mentally handicapped people would be reduced to 33 000 with about the same number in residential care in the community. But despite the decline there is still some way to go: by 1977, 47 717 mentally handicapped people were in hospitals in England and 78% had been there for 5 years or more. The majority are still in large hospitals in isolated sites away from towns and villages, as well as away from relatives.

**Table 7.7 Admissions (total, first and re-admissions) per 100 000 population to mental handicap hospitals and units, 1970-1977**

<i>Admissions</i>	<i>1970</i>	<i>1972</i>	<i>1974</i>	<i>1976</i>	<i>1977</i>
All admissions	23	25	26	30	32
First admissions	5	4	3	3	3
Re-admissions	18	21	23	27	30
Ratio re-admissions to first admissions	3.6	5.3	7.7	9.0	10.0

Source: Data extracted from Department of Health and Social Security (1980). *In-patient Statistics from the Mental Health Enquiry for England, 1977*. (London: HMSO)

Between 1970 and 1977 there was an increase of about 39% in admissions to mental handicap hospitals and units in England (see Table 7.7). However, over the same period first-admissions fell whilst re-admissions increased disproportionately, suggesting that a smaller proportion of mentally handicapped people are admitted to hospital and that they then experience a series of short stays.

The general philosophy is that no matter how limited the abilities of a mentally handicapped person, he can be trained to his maximum capacity and to acquire skills if this is undertaken in a stimulating environment. It is frequently argued that the medical/nursing model, with its high dependency approach, is not appropriate for people who are mentally handicapped and it has been suggested that some of the functions of the hospitals should be transferred to other agencies to produce a more home-like atmosphere. The view is being increasingly accepted that many mentally handicapped patients in hospital are in the wrong living environment.

For many years the only alternative to home care was the hospital. Today there is an increasing variety of alternatives in the community. However, these represent only a small proportion of the total, and hospitals are still the major contributors to residential care.

The present policy is for health authorities to build small units with less than 100 beds, though by the late 1970s less than 10% of mentally handicapped people in hospitals were in such units.

### *Local authority residential care*

The type of residential care which can be provided by the local authority social services department varies with the degree of social competence of the individual. The person may be placed with foster parents, in lodgings, in a home or a hostel specifically for mentally handicapped people or an unstaffed hostel supervised and supported by social work staff.

*Local authority hostels.* The usual local authority hostel has about 25 beds with attached staff accommodation. Each person has a single bedroom and there is a dining room, lounges and toilet facilities. A few such hostels have self-contained flats to encourage independent living. In 1980 there were about 11 500 places in local authority homes and hostels in England and Wales, about 1100 of these in unstaffed homes. The latter provision showed almost a four-fold increase between 1976 and 1980. Less than a third of staff in these hostels have had any training. Some hostels in the community cater for severely handicapped children quite successfully and in a few places mentally handicapped children are taken into ordinary children's homes. Some local authority residential provision has been criticized as over-

elaborate (e.g. the provision of 'sluices' when the policy is not to admit incontinent residents). The unsupervised hostels are normally in ordinary premises with a maximum of five residents who make their own arrangements for meals, etc. and go out to work. Varying degrees of support are given through social workers and domestic help.

*Boarding out arrangements.* Some local authorities pay enhanced boarding out allowances for mentally handicapped children.

*Short-term care.* Short-term care is an important feature of both hospital and local authority residential services. If mentally handicapped people are taken in for a short period it relieves the family and may give them the opportunity to take a holiday. Many foster schemes have short-term care as their central aim.

*Family support.* The presence of a mentally handicapped person can give rise to special problems in a family. Aside from short-term care support for a family can be given by a health visitor, social worker or voluntary worker. Usually this takes the form of advice and information about service availability. Families are often helped by being put in contact with other parents with similar problems, and practical assistance with transport for visiting or workload (e.g. nappy service) is usually very valuable.

Often the provision of adequate and suitable housing can ease the problems of dealing with a mentally handicapped person. A frequently voiced concern amongst parents is the fate of the handicapped son or daughter when they die. The voluntary organization MENCAP (Royal Society for Mentally Handicapped Children and Adults) attempts to meet the problem with its trusteeship scheme (mentioned later).

### **Home teaching**

It is recognized that education of a mentally handicapped child should start as early as possible. In some parts of the country peripatetic teachers visit the home and work with parents. Parents are encouraged to stimulate their children and teach them skills. A number of different schemes for use by parents in teaching their children are in operation in Britain.

One is the Portage Project, which was developed in the small town of Portage, Wisconsin, USA. The child is assessed by a home teacher on a developmental checklist and parents are trained to teach skills in accordance with a set scheme. The project has the advantage that it does not require highly skilled teachers. After a short training course health visitors and social workers can effectively work with the parents. Eighty per cent of pre-school children who are severely mentally handi-

Age Level	Card	Behaviour	Entry behaviour	Date achieved	Comments
3-4	55	Counts to 10 objects in imitation	/	/	
	56	Builds a bridge with 3 blocks in imitation	/	/	
	57	Matches sequence or pattern of blocks or beads	/	/	
	58	Copies series of connected V strokes VVVVVVVV	/	/	
	59	Adds leg and/or arm to incomplete man	/	/	
	60	Completes 6 piece puzzle without trial and error	/	/	
4-5	61	Names objects as same and different	/	/	
	62	Draws a square in imitation	/	/	
	63	Names three colours on request	/	/	
	64	Names three shapes, , 0	/	/	
	65	Picks up specified no. of objects on request (1-5)	/	/	
	66	Names five textures	/	/	
	67	Copies triangle on request	/	/	
	68	Recalls 4 objects seen in a picture	/	/	

**Figure 7.12** Home teaching service for families with a mentally handicapped child: example of items from developmental checklist. Source: Bluma, S., Shearer, M., Froman, A. and Hilliard, J. *Portage Guide to Early Education*. Revised Edition, 1976. Portage, Wisconsin, USA

capped live at home with their parents and the most frequent professional visitors to the family are the health visitor and social worker. If this scheme is in operation each child is usually visited weekly and each visit takes one to two hours. Developmental areas covered include socialization, language, self-help, cognitive and motor skills. An example of cognitive developmental checklist and the curriculum guide is given in Figures 7.12 and 7.13.

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**AGE 3-4**

**TITLE:** Matches sequence or pattern of blocks or beads

**WHAT TO DO:**

1. Use a set of blocks with several different kinds of shapes.
  2. Make a tower or bridge explaining the extra details. Encourage the child to imitate and give physical help as the child learns the skill. Reward improvement with praise.
  3. If the child has number concepts, encourage him to count the number of blocks needed.
  4. Sit next to the child when doing this activity so he can see the object from the same view as the model.
  5. Put a treat at the end of the line of blocks or beads for child when he completes his model.
- 

**Figure 7.13** Home teaching service for families with a mentally handicapped child: example of a card in the curriculum guide. Source: as Figure 7.12

### **Financial support**

Mentally handicapped people are entitled to the same financial benefits as the general population but four additional benefits may be payable because of the handicapping condition. These are: attendance allowance; mobility allowance; invalid care allowance; and non-contributory invalidity pension.

The same benefits apply to physically handicapped people and are described in detail in Chapter 5.

### **Voluntary services**

A range of voluntary organizations is solely or partly orientated towards the needs of mentally handicapped people. Many have a long tradition of providing care and support for the mentally handicapped. This can include the provision of residential accommodation (there were 4000 places for the mentally handicapped in registered private and



voluntary homes in England and Wales in 1980); day nurseries and play groups; social clubs and recreational centres; holiday homes and outings and toy lending libraries. MENCAP is a voluntary society with branches throughout the country and is exclusively concerned with the mentally handicapped and their families. This society provides a wide range of advice and help. It provides information by way of leaflets and journals and is responsible for a number of residential homes and training establishments for further education of mentally handicapped school leavers. The society also has a trusteeship scheme which provides a visiting service for mentally handicapped people after the death of their parents.

Some voluntary organizations provide residential care on the 'village basis'. Some of these villages take up to 200 residents and are relatively self-sufficient with sheltered workshops, village halls and often farming as a main activity. This approach has been criticized on the grounds that it isolates the mentally handicapped from the rest of the community and provides an over-protected environment.

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## Elderly people

### INTRODUCTION

Old age is not a straightforward concept. Chronological age is only a rough guide to the biological age of an individual; examples can be cited of alert and active octogenarians as well as those who have appeared to age prematurely.

It has been suggested that we should think only in terms of biological age as measured by abilities and performance of the individual. However, society, increasingly bureaucratized, adopts for record-keeping and administrative purposes the convenient label of chronological age. In the United Kingdom, the term 'elderly' is used to describe all people who are eligible for national insurance retirement pension: 60 years and over for women, 65 years and over for men. There is a tendency, however, to use the age of 65 years and over for both sexes, as a means of classifying people as 'elderly' for purposes of planning and the delivery of services. This latter definition of the elderly is used here.

In this chapter, brief reference is made to the theories of ageing. The demographic origins of the present elderly population and their implications are described as well as the adverse physical, mental, social and financial factors which are frequent accompaniments of the ageing process. The spectrum of services available to attempt to meet the problems of the elderly population are also examined. Special problems such as hypothermia, home accidents, urinary incontinence and mental illness are dealt with in a separate section of the chapter.

The emotive issue of the compulsory removal of old people from their homes to residential accommodation is discussed. Finally, a critical review is given of the present standard of care of elderly people in the population.

## Some statistics

### *Profile of elderly people*

- Sixty per cent of elderly people are women
- Four times as many women are widowed than men
- Thirty-five per cent of 75 and over live alone; 55% of 80 and over live alone
- Eight per cent bed-fast, housebound elderly never receive visits from relatives; 47% never receive visits from friends
- Elderly people often live in houses lacking basic amenities, such as indoor WC, bath or hot water

### *'High risk' elderly*

Elderly people at high risk include those who are:

- Housebound
- Recently discharged from hospital
- Recently bereaved
- Living alone
- Over 80 years old

### *Health and social services*

People over 65 years:

- Use almost 60% of both health and social service budgets
- Account for 25% of hospital admissions
- Occupy 50% of hospital beds

Compared with younger age groups, over 65s:

- Are admitted to hospital twice as often
- Stay twice as long
- Visit their general practitioner 50% more
- Visit their dentist 50% less

And for over 75s:

- The cost of treatment is seven times more than the average

### *Handicapped elderly people:*

- Thirteen per cent of the elderly are physically handicapped in the sense that their daily living activities are severely restricted
- Fifty per cent of the elderly report they have some disability
- Fifty per cent of all mentally ill and physically handicapped people are over 65 years
- For every two severely confused persons in psychiatric inpatient care there are three in geriatric hospitals.
- For every confused elderly person in long-term institutional residence five are cared for at home.

## **THEORIES OF AGEING**

From ancient times Man has searched for the formula which might somehow bestow perpetual youth; for not only has he sought to lengthen life, but also to avoid the gradual but inevitable decay into old age. It is only relatively recently that concern with ageing has moved from the poets and philosophers to scientists.

The science which deals with the physiology, psychology and sociology of ageing is called gerontology. The many theories of ageing range from the purely philosophical to those based on scientific evidence.

There have been suggestions that ageing is the result of the accumulation of toxic material, an 'accumulation of errors' in cell reproduction which leads to deterioration in cellular function. On the other hand, it has been suggested that a hypothetical irreplaceable substance exists, having reserves that are gradually used up throughout life. Certain cells of the body – such as neurons – are not capable of division, and therefore cannot be replaced during life. Loss or injury of these cells, it has been postulated, is the basis of senescence. Another insight into the possible cellular basis of ageing was provided by the observation that human cells, maintained outside the body in culture, have a finite lifespan; moreover, although youthful human fibroblast cells will undergo about 50 divisions before dying, those taken from aged adults undergo only five divisions. The explanation of this phenomenon, which appears to hold true for cells within the body as well as for those maintained in culture, may be one of the keys to the fundamental ageing process. Undoubtedly man, like other species, has a maximum life-span. The programmed theory of ageing is another approach which involves genetics and suggests that certain neurons in the brain act as pacemaker cells, a neurobiological clock, controlling growth, development, maturation, ageing and death. It is proposed that the pacemaker cells are related to the hypothalamus, which itself exerts control over the endocrine system. This clock is seen as being programmed to run down in a certain time, though this may be influenced by external and internal factors.

However, despite considerable research there is as yet no generally accepted explanation of the fundamental biological process of ageing.

Alternatives to the biological approach are provided by various social and psychological theories of ageing. Two of the best known are the disengagement and the activity theories. The disengagement theory sees normal ageing as a mutual withdrawal, phasing out or separation between the individual himself and society as a whole. It is viewed as inevitable and advantageous to both the individual and society. It is the means by which society can maintain an orderly transfer of power so that older people in key roles are replaced by younger people who are

assumed to be more capable of carrying out the tasks. Furthermore, through the disengagement of people who are in the older phases of their lives there is less danger of disruption of vital functions of society by the sudden death of one of its key members. By this means, disengagement allows for the maintenance of social stability and the continuance of an efficient functioning of society. The process can be seen to be institutionalized within the rules of society and is often marked by rituals like the retirement ceremony. This theory also holds that the process of disengagement is beneficial to the old person himself; for by withdrawing from many of the social roles expected of a middle-aged person, the elderly person is freer to express himself and to follow his personal interests. This theory may not be particularly appropriate to British culture where the work ethic is strongly held. Status and social contacts in this society are largely obtained through one's job.

The 'activity' theory sets out the converse view and proposes that the key to successful ageing is continuing engagement in activity, both physical and social, within his limits so that the elderly person acts and behaves as normal. This approach fits better into our culture although the adverse affects of ageing events are frequently seen in the conflict which arises when other members of society constrain the person into accepting that he is elderly.

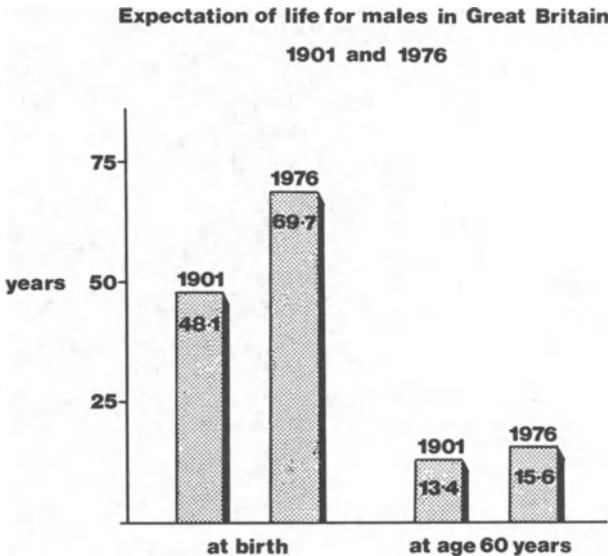
## **AN AGEING POPULATION**

### **Origins of the elderly population**

In the United Kingdom in 1901 there were 1.8 million people over the age of 65 years out of a population of 38.2 million, representing 4.7% of the total, whilst there were only half a million 75 years and older, or 1.3% of the total population. By 1980 the situation had changed dramatically; out of an estimated mid-year population of 56 million, 8.4 million (15%) were aged 65 years and over, and 3.2 million (5.7%) were aged 75 years and over.

It is a popular misconception that the increase in the number and proportion of elderly people over the last 30 years has been due to advances in medical science; new drugs and high technology allowing older people to live longer. For the real reasons for the present ageing population, however, it is necessary to look back to the turn of the century.

Then there was a marked improvement in infant and child mortality which coincided with one of the periodic increases in birth rates. Hence, more children were born and more survived to provide the present elderly population. Falling birth rates during the depression of

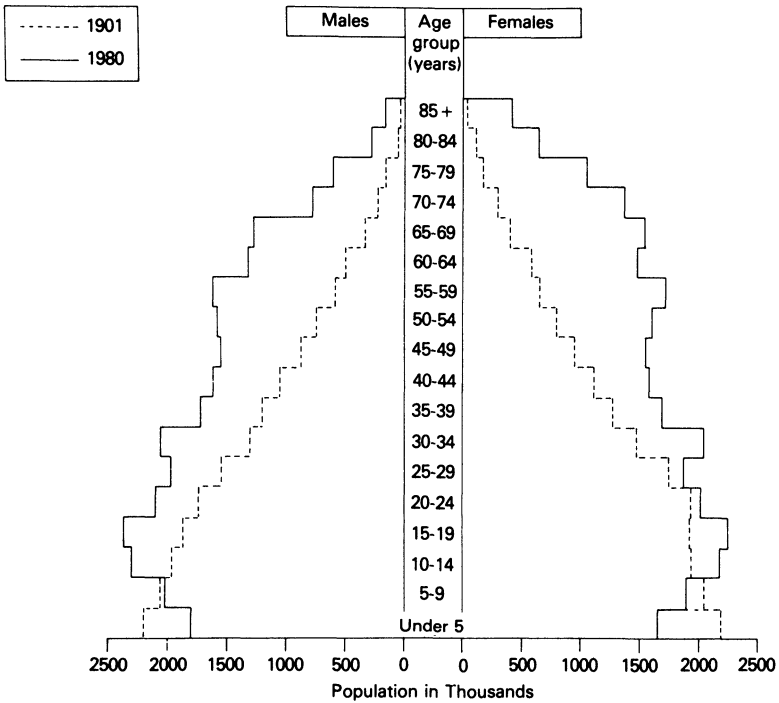


**Figure 8.1** Life expectancy for males in Great Britain, 1901 and 1976. Source: Donaldson, L. J. (1981). A demographic tidal wave. *Geriatr. Med.*, 11, 81–84. Data originally derived from Government Actuary's Department Estimates

the 1930s later served to increase the elderly as a proportion of the total population.

A male child born in 1901 could expect on average to live a further 48 years, whereas a male child born in 1976 could expect on average a further 70 years of life. In contrast, a man aged 60 years in 1901 could expect to live a further 13 years, whereas a man of the same age in 1976 could expect on average to live for about 16 more years (see Figure 8.1). Thus, very little change in survival has occurred for people who have reached middle-age and later life, but a very dramatic improvement has occurred in expectation of life at birth. This change has not been fully explained, but is thought to include such things as improvement in living standards, public hygiene, nutrition and the emergence of qualified midwives. It was certainly well before the advent of advanced therapeutic procedures.

These differences are reflected in the shape of the population pyramids (see Figure 8.2). At the turn of the century the age structure of the population of Britain plotted graphically, did indeed resemble a pyramid, with large numbers of young people at its base and very few elderly people at its peak. In this respect it resembled present-day developing countries such as India or Brazil which also have pre-



**Figure 8.2** Sex and age structure of the population of the United Kingdom, 1901 and 1980

dominantly young populations with the proportion of elderly people being some 4–5%. The present-day age structure of Britain's population causes the graph to look more like a box than a pyramid, with a relative shrinking in the numbers of young people and a larger proportion of elderly people.

### Other demographic and social changes

Improvements in mortality as indicated by changes in life expectancy at birth have not affected the two sexes equally. Females have progressively improved their position throughout in relation to men. This greater improvement in survival for women is a result of a complex relationship between behavioural, social, environmental, economic and genetically linked factors. The excess male mortality can be largely accounted for by higher mortality from coronary heart disease, carcinoma of the bronchus, cirrhosis of the liver, and fatal accidents. This subject is further discussed in Chapter 2.

The favourable position of women compared with men has affected the composition of the elderly population and also has implications for the provision of services. There is a large population of elderly women who have out-lived their husbands (Table 8.1) and who are beset by the range of medical and social problems associated with old age without the usual first-line of support: the spouse.

**Table 8.1 Female to male ratios (number of females per 100 males) in the population of England and Wales according to age**

<i>Year</i>	<i>Female to male ratios</i>			
	<i>65-74 y</i>	<i>75-84 y</i>	<i>85 +</i>	<i>All 65 +</i>
1901	125	138	172	130
1951	136	154	225	145
1971	138	202	286	161
1981	130	191	327	155
1991	127	180	309	153
2001	122	173	296	150

Source: Derived from reports of various censuses and the Office of Population Censuses and Surveys population projections

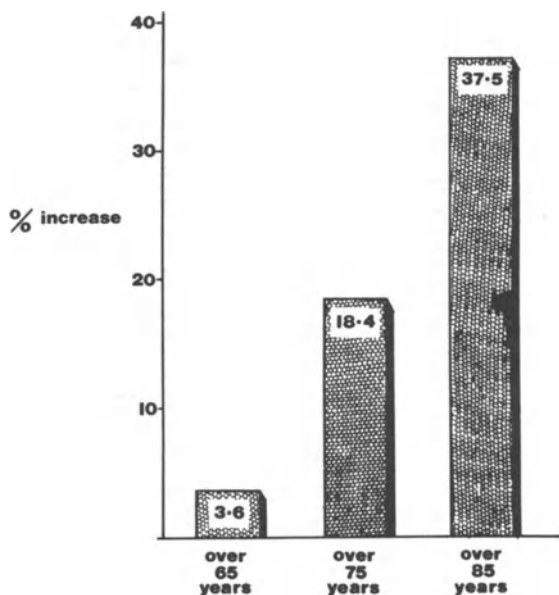
Other demographic forces are at work serving to heighten the problems of the elderly population. Family size has fallen during the present century, the change away from the Victorian tendency to have large families, means fewer adults with children available to give support to their elderly parents. More profound are the influences of society, such as the changing structure and aspirations of the family with its increased geographical mobility, as well as the changing role of women, all of which have served to increase the isolation of some elderly people and hence their vulnerability.

### **Future population changes and service implications**

The immediacy of the problems posed by the elderly population is highlighted by a simple demographic fact: the elderly are not a homogeneous group. Although the predicted increase in the over-65s is of the order of 4% by 1991, the greatest increase will occur amongst the very elderly, where the number of over-75s will increase by 18% and the number of 85s by 38% (Figure 8.3).

It is well known that the elderly make much heavier demands on health and social services than do the young, and the most elderly make the heaviest demands of all. For example, whilst the population of over-65s in any type of institutional care in a health district was only 4% the proportion of those aged 75-84 was 6%. For those aged 85-94,





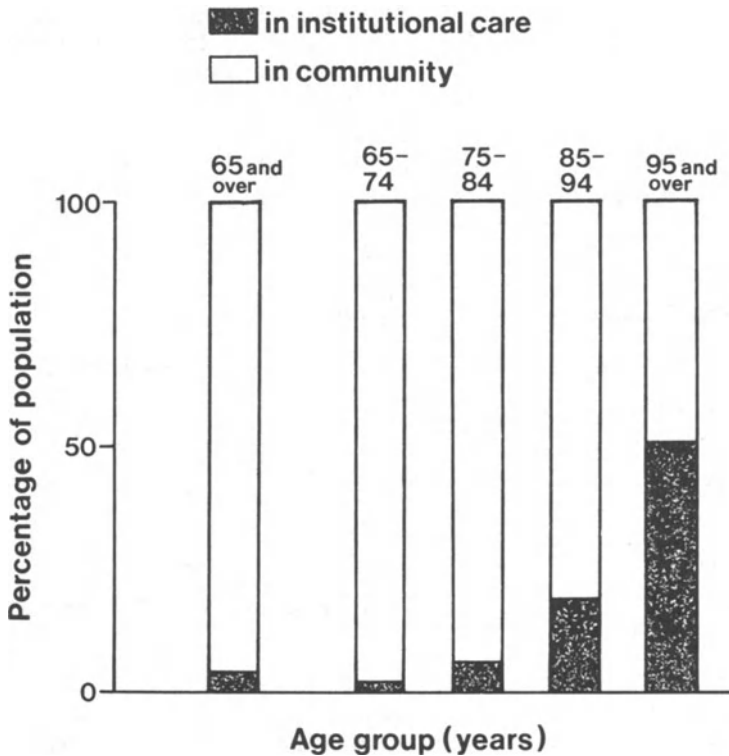
**Figure 8.3** Projected elderly population increase in England, 1979-1991. Source: Donaldson, L. J. (1981). A demographic tidal wave. *Geriatr. Med.*, 11, 81-84. Data originally derived from OPCS Projections

the figure rose to 19% and for those over 95 years it stood at 51% (Figure 8.4). The very elderly have the highest rate of hospital admission and their average duration of stay is very much longer.

The elderly are not evenly distributed geographically throughout the United Kingdom. A higher proportion of the population is elderly in England than it is in Scotland or Northern Ireland. Also within England there are wide variations that range from 11.7% in the Oxford Regional Health Authority to 16.9% in the South Western Regional Health Authority.

### **NEGATIVE FORCES OF OLD AGE**

Whether an elderly person requires help or support from services ultimately depends on how well they are able to perform those physical and social skills which are essential for daily living. Particularly in



**Figure 8.4** Proportion of the elderly population of Leicestershire who were in any type of institutional care in 1976, by age group. Source: Donaldson, L. J. (1981). The elderly in care: problems and challenges. *R. Soc. Health J.*, **100**, 124-129

advanced old age, independence is often difficult to maintain in the face of the many adverse features which accompany it.

### **Mental and physical deterioration**

Senescence, sometimes called 'natural' or primary ageing, refers to the decline in physical and mental functions (loss of vigour) and the impairment in social adaptation which occurs with old age. All systems of the body are affected by the ageing process, although the rate of decline is different for each system and the extent of these changes varies amongst individuals.

Anatomical changes in organs tend to lead to a loss of component cells and an increase in the surrounding connective tissues; in addition, other products such as pigments or lipids accumulate. Such anatomical

changes are accompanied by physiological changes in the way the systems function. Table 8.2 shows how the effects of age impair the function of different bodily systems to a different extent. Some of these changes are easily recognizable and are generally acknowledged as features or stigmata of old age. The skin becomes wrinkled and dry with a tendency to increased pigmentation, hair greys and is lost, and a decline in muscle strength and limitation in the range of movements of joints, leads to altered posture and gait.

**Table 8.2 Age decrements in physiological performance**

<i>Physiological function</i>	<i>% reduction at age 80</i>
Nerve conduction velocity	15
Cardiac output – resting	30
Vital capacity	50
Renal blood flow	50
Maximum breathing capacity	60
Maximum work rate	70
Maximum oxygen uptake	70

Source: Exton-Smith, A. N. and Overstall, P. W. (1979). *Guidelines in Medicine*, Vol. 1; *Geriatrics*. (Lancaster: MTP)

Collagen, the supportive tissue of the body, is more rigid and less elastic in old age and the hardening of the collagen is responsible for much of the stiffening of the body as a whole, which is always seen in old age. Changes in the special senses lead to deterioration in vision, hearing, taste and smell. Loss of visual acuity which occurs from the mid-40s (presbyopia) results from loss of ability to change the focal length of the lens of the eye; such impairment of accommodation produces difficulty with near vision, an almost universal accompaniment of old age. Similarly presbycusis refers to the impairment with ageing of hearing, which is particularly noticeable with the high-frequency sounds and typically manifests as a difficulty in hearing conversation in a noisy background.

Intellectual performance is also affected by the ageing process. Intelligence scores increase to early adulthood but then level off (rather than decline) until late in life. Minor changes in cognitive functioning may be relatively unimportant in influencing the lives of elderly people. What is a serious problem is the onset of changes in the brain which give rise to loss of memory, disorientation, and distortion of behaviour; symptoms which affect an increasing proportion of the elderly population and bring them into contact with services.

**Disease and disability in old age**

Secondary or pathological ageing (senility) refers to the disabilities in the elderly resulting from disease or trauma. One of the characteristics of any ageing organism is that the older it becomes the greater is the risk of impairment, disease and death. In most organisms, including man, the risk of death fluctuates during the early years of life before beginning to rise progressively with time.

Ageing is related to disease in three main ways:

- (1) *Altered response to disease* – some diseases are overcome less easily when they occur in elderly people than in younger people, e.g; pneumonia, fractures.
- (2) *Diseases associated with ageing* – some diseases are so closely associated with ageing that they occur to some extent in all individuals as they age. The best example of this is arterio-sclerosis.
- (3) *Increased risk with ageing* – many diseases, although not exclusive to ageing individuals, occur much more commonly when old age is reached. Examples of this are many of the common neoplasms.

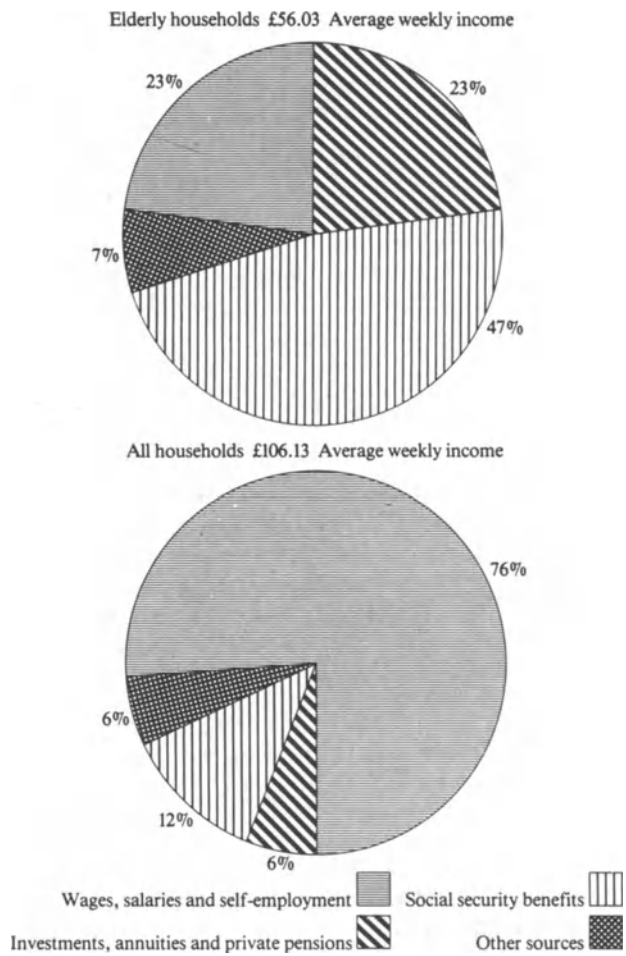
The hallmark of the occurrence of disease in the elderly is the presence of multiple pathology. Few elderly people suffer from a single disease, but several chronic degenerative processes – some surfacing for the first time in old age, others carried over from middle age. Similarly the presence of impairment, disability and handicap increases markedly with advancing years.

**Economic and social factors**

Changes in the position of elderly people in society are also closely related to the economic effects of growing old. Figure 8.5 compares income of elderly households with all households. State pensions and supplementary benefits provide the main source of income for elderly people.

Even in those households where some income was gained from employment, 42% derived more than half their income from State retirement pension and supplementary benefits. This problem of low income is compounded by the fact that whereas nearly 50% of pensioners are entitled to claim supplementary benefit, only 20% do so.

Despite the pronouncements of successive governments of the importance of adequate levels of pensions, since World War II rates of retirement pension and supplementary benefits as a proportion of average male gross industrial earnings remain virtually unaltered. For example, retirement pension for a married couple in 1949 was 30.4% of



**Figure 8.5** Household income by source, in the United Kingdom, 1978  
Source: Department of Health and Social Security, Welsh Office, Northern Ireland Office (1981). *Growing Older*, Cmd paper 8173. (London: HMSO)

average male gross industrial earnings and in 1976 was 31.6%.

The median weekly disposable income for a household comprising one adult mainly dependent on State pensions in 1979 was £27.56 and for a couple retired and mainly dependent on State pensions was £41.83. These figures compare with £50.61 and £109.63 for households containing one adult (not retired) and a couple (not retired) respectively.

However, comparison of standards of living of the elderly with those of the younger age groups in society on the basis of annual income is complicated by the fact that younger adults have outgoings arising, for example, from dependants and mortgage repayments, whilst elderly people enjoy better tax concessions. There is evidence that in comparison with other age groups the elderly fare worse in other ways. For example, they live in houses of poorer standard, more often lacking basic amenities, such as indoor toilets, bathrooms and hot water supply. Compared with younger age groups they are less likely to possess household goods (such as television and refrigerator), less commonly eat fresh meat most days of the week, or have holidays away from home.

Our present-day society creates problems for the elderly, not only because of the inherent problems of change, but because of the speed of change that makes it difficult for elderly people to adjust. The elderly are often confused by technical and commercial changes such as decimalization, metrication, one-man buses and computerization of data. The rapid changes in social and moral values leave many elderly people bewildered, so that unless they are able and willing to keep continually up-to-date with knowledge and to adjust their attitudes, they find themselves anachronistic outcasts, sometimes self-imposed, in a rapidly changing world.

### **Loneliness and isolation**

Approximately one-third of all elderly people live alone and 44% with a spouse and no-one else (Table 8.3). The greater the age, the higher the proportion who live alone – 35% of men aged 85 years and over live alone and amongst women aged 85 years and over the figure is 51%. There is a growing problem of isolation amongst elderly people, particularly in the inner-city areas from which the young have migrated and to which (because of the nature of housing) there may have been an influx of immigrants bringing with them different cultural styles and values which may be confusing and even frightening for the elderly person.

A survey of elderly people in private dwellings in England in 1976<sup>1</sup> showed that 20% of those aged 85 years and over and 28% of those

**Table 8.3 Type of household in which elderly people in private households were living (percentages), Great Britain, 1977-1978**

<i>Household</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>
Alone	16	44	33
With spouse only	62	32	44
With spouse and others	13	5	8
With children	5	12	9
With other relatives	3	7	5
Others	1	1	1
Total	100	100	100

Source: Central Statistical Office (1979). *Social Trends* No.10, 1980 Ed. (London: HMSO)

living alone – both known to be vulnerable groups – had received no visits within the previous 6 months from any health service (including doctor, health visitor, nurse), social services (including home helps, meals-on-wheels) or voluntary organization personnel.

Loneliness can be a major factor in many of the problems of the elderly and it causes apathy and lack of interest leading to a sequence of events such as malnutrition, hypothermia, and general self-neglect.

An influential survey by Townsend<sup>2</sup> of the family life of old people in London during the 1950s demonstrated that the extended family was the dominant interest of most old people and that those not living with relatives were in regular contact with them. How far the situation in East London in the mid-50s applies to other parts of Britain in the 1980s is a matter for conjecture. However, despite the social and demographic changes already mentioned such as fewer children, increased geographical mobility and changing attitudes to work, the vast majority of support of elderly people is carried out by relatives and not by statutory or voluntary services. It is, however, those who have no supporting relatives and are living alone, particularly the incapacitated or the very elderly, who are at greatest risk and in need of help.

### **Retirement and bereavement**

Two of the major factors which affect the material and psychological well-being of an elderly person are the loss of employment (and hence income and status) and the loss through death of the companionship of husband, wife or peers.

Most industrialized countries have an age of enforced retirement, usually 60 or 65 years of age. Aside from the economic consideration, loss of employment can have profound effects on the elderly person. Many people's lifestyle and leisure pursuits are determined by their

occupation and after retirement it is necessary to structure life differently.

As has already been discussed, loss of a spouse is more likely to occur to a woman and this together with the cumulative effect of the loss through death of close friends and acquaintances, can lead to loneliness, isolation and depression in the elderly.

## **SOME SPECIAL HEALTH PROBLEMS OF THE ELDERLY**

### **Hypothermia**

In recent years health workers have become increasingly aware of the dangers of hypothermia in the elderly, particularly during the winter months. Accidental hypothermia is said to be present if a deep body (core) temperature falls to be below 35 °C. The term 'accidental' is used to distinguish this type of hypothermia from that which might be induced deliberately for therapeutic purposes. The diagnosis must be confirmed with a special low-reading thermometer inserted rectally; such instruments are becoming an increasingly common part of the equipment of doctors and nurses working in the community.

It is estimated that 3–4% of people aged 65 years and over who are admitted to hospital have a core body temperature below 35 °C; moreover, although a survey published in 1973<sup>3</sup> of a sample of elderly people in the community showed that only a very small proportion had core temperatures below 35 °C, 10% of temperatures were in the range 35–35.5 °C. Over 90% of cases of accidental hypothermia occur indoors. About 75% of the elderly were living in rooms with temperatures at or below 18.3 °C, the minimum level recommended for council housing at that time.

The elderly patient with hypothermia does not usually shiver or complain of being cold because of an impaired perception of temperature change. However, the skin is pale and cold to the touch, and consciousness is clouded leading to drowsiness, disordered thought and speech. Coma is more likely the lower the body temperature. Movement and reflexes are sluggish, speech may be slurred and the hearing and respiratory rates are slow and characteristic changes in ECG may be present; the blood pressure may also fall. Some patients with hypothermia may become agitated and restless and if tranquillizers are prescribed this can complicate their serious condition.

Fatality amongst patients with hypothermia is high: 33% of those with core temperatures between 35 and 30 °C will die, and this figure increases to 70% when the core temperature is below 30 °C. Treatment, usually in hospital, consists of gradual rewarming (if conducted too



rapidly this may be fatal) and other supportive measures, such as administration of oxygen, intravenous fluids, and broad-spectrum antibiotics.

The main causes of accidental hypothermia are defective thermoregulatory mechanisms (a consequence of ageing) and exposure to cold through low environmental temperature. Other factors such as immobility due to general infirmity, mental impairment, strokes, falls, effects of medicines, certain illness (e.g. infections, endocrine disorders) may be superimposed.

A programme of prevention is the most effective answer to hypothermia. Living accommodation should be properly heated and the old person should be encouraged to move around to increase body heat by metabolic activity and to ensure adequate nutrition and clothing, especially in advanced age. Financial support for heating and health education are the main strategies. In addition, all health professionals should be made aware of, and be vigilant for, the danger signs of hypothermia, especially in cold weather.

### **Accidents**

In 1979, 3691 elderly people died from accidents in the home in Britain, which was approximately 60% of all home accidental deaths. Falls were responsible for the majority of these accidents, the remainder resulting from poisoning, fires, suffocation and other causes.

### **Falls**

The propensity of the elderly to fall over has long been recognized. Many falls in the elderly will produce no injuries. A common outcome of a fall is, however, a fracture (see Table 8.4), in part because of the increased fragility of bones in old age. Fracture of the neck of the femur is a particularly serious example which can result from seemingly quite trivial falls. Even with a modern approach of immediate operation (to pin the fracture or replace the hip joint) and early mobilization, fatality is still around 25%. A less serious fracture, such as Colles' fracture of the wrist, may still be a considerable handicap for an elderly woman attempting to cook her meals and do her housework with an arm immobilized in plaster.

The causes of falls (see Table 8.5) have been classified into:

- (a) *Trips or accidental falls*, which account for more than one third of all falls in the elderly. There is a decline in the proportion of falls due to this cause in the very elderly, possibly because of their decreased mobility, combined with the growing importance of other causes.

- (b) *Drop attacks*, which are sudden falls (without warning), not the result of a trip, in which consciousness is retained throughout. The precise mechanism is not clear although it is thought to be due to a momentary reduction in the flow of the blood through the vertebral artery.
- (c) *Giddiness* is a less common cause of falls possibly because the slow development of an attack allows the elderly person to grab hold of something or to sit down. Giddiness is, however, a more important cause of falls amongst the very old. There are very many reasons why giddiness can occur such as hypertension, cardiac insufficiency, transient ischaemic attacks, or side effects of therapy.
- (d) *Loss of balance* may also be caused by a variety of factors, perhaps disorder of the labyrinthine apparatus.

**Table 8.4 Proportion of falls which resulted in fractures in a sample of elderly people**

	<i>No. with falls</i>	<i>No. (%) sustaining fractures</i>
<i>Men</i>		
65–74 years	44	10 (18%)
75 and over	87	26 (30%)
<i>Women</i>		
65–74 years	77	21 (27%)
75 and over	113	46 (40%)

Source: Exton-Smith, A. N. (1977). Functional consequences of aging. In: *Care of the Elderly: Meeting the Challenge of Dependency*. (London: Royal Society of Medicine)

**Table 8.5 Causes of falls in a sample of elderly women**

<i>Cause</i>	<i>Falls (%)</i>	
	<i>Age group (y)</i>	
	<i>65–74 (n = 77)</i>	<i>75 + (n = 113)</i>
Tripping	37	22
Drop attacks	14	12
Giddiness	6	16
Loss of balance	10	9

Source: As for Table 8.4

All cases of falls in the elderly should be investigated to determine whether there is any underlying correctable pathology present, but the main strategy is prevention. Much can be done to prevent falls in the home by simple measures such as minimizing the use of stairs and steps, attending to loose stair rods, uneven carpets and dangling flex and providing adequate lighting. The elderly persons' vision and hearing should be tested and if necessary spectacles and hearing aids supplied. Ensuring the wearing of proper footwear rather than loosely fitting carpet slippers is another important preventive measure. Careful use of medications, particularly hypnotics and tranquillizers, in the very elderly is also very important. Such health educative measures may be introduced by health visitors, social workers and general practitioners if they are in regular contact.

### **Urinary incontinence**

Urinary incontinence is a common problem in the elderly. It is perhaps the most embarrassing, distressing and ultimately humiliating sequel to old age; moreover, its onset is often the reason why the elderly person is judged as no longer fit to remain in his or her own home, rejected in a family or friend's home, or seen as an unsuitable candidate for certain forms of residential care.

The causes of urinary incontinence are many and may arise from local factors, e.g. bladder neck obstruction (most often due to prostatic enlargement), stress incontinence (usually due to weakening of pelvic floor musculature following childbirth), urinary tract infections or general factors. General factors in the elderly which may lead to incontinence are often multiple and not clear cut. A common reason for urinary incontinence is loss of inhibition of need to void when the bladder is partly full. This mainly occurs at night and is associated with early brain failure. Emotional upsets resulting from bereavement, accidents or illnesses can give rise to incontinence of either a transient or a permanent nature. Confusion arising from organic cerebral disease (including stroke) or side effects of sedatives or psychotropic drugs can also lead to incontinence. Other drugs such as rapidly acting diuretics may also contribute. Incontinence may be a feature of limitation of mobility so that the elderly person is unable to reach the toilet in time to avoid an accident.

The cornerstone of management of urine incontinence in the elderly is making a correct diagnosis of the cause and a sympathetic and understanding attitude on the part of the professionals. It cannot be over-emphasized that the presence of incontinence is a deeply emotional issue both for the elderly person who has it and relatives, friends and neighbours who are in contact with him. Incontinence is seldom the

result of a single underlying cause, but all efforts should be made to carry out a full investigation.

In some cases operative treatment of an enlarged prostate or gynaecological disorder, treatment of an underlying urinary tract infection, or review of a long-standing drug regime may solve the problem. Aside from these measures probably the most important step in treating urinary incontinence is bladder training. For incontinent patients already in an institutional setting, episodes of incontinence are recorded on a fluid chart, and nursing staff ensure regular toileting of the patient to re-educate the bladder. Such bladder training may be supplemented by physiotherapy in the form of exercise for the pelvic floor muscles. Despite such measures some will continue to experience episodes of incontinence. For the majority who are in the community the approach to bladder training would probably include a self-administered chart to encourage regular (say two hourly) visits to the toilet and recording of wet and dry periods of the day. This might be carried out in conjunction with a trial of imipramine medication.

In the community, for patients who have problems with mobility, the provision of bedpans or other suitable receptacles in the home may be helpful, as may the provision of a commode or chemical closet in the bedroom or living room when the toilet is some distance away. If incontinence still cannot be controlled with these measures, a number of steps may be taken to provide protection and increased comfort for the elderly incontinent patient. Stigma is still attached to the idea of the catheter in the minds of many health professionals, who often regard its use as an abject failure of management. This is quite unjustified. The modern disposable in-dwelling urinary catheter is of value in carefully selected cases. The likelihood of urinary infection is high, but will seldom lead to systemic infections and with careful management involving catheter changes and bladder washouts performed regularly by a district nurse in the home, the elderly person with intractable incontinence can enjoy a freedom quite impossible without it. In the male other appliances may be fitted to the penis to avoid the use of an in-dwelling catheter. Usually these are in the form of a sheath surrounding the penis with the urine collecting in a bag strapped to the inside of the leg. In the female special pants, e.g. Kanga pants (in which urine passes through a one-way fabric into a disposable pad contained in a front pouch) or disposable pads and pants can also be of value.

### **Nutrition in old age**

There is no special diet for elderly people; they should eat the same as the rest of the adult population. However, if elderly people become less active they require less food and they may become obese if they do not reduce their food intake. If they eat less to avoid becoming overweight

it is important to maintain a balanced diet with all the necessary nutrients.

The diagnosis of malnutrition in old people is difficult because often there are co-existing medical conditions and there is considerable lack of knowledge of changes which accompany the ageing process. The clinical manifestations are usually non-specific and laboratory investigations are only of limited value.

The results of a major survey on the nutritional status of elderly people was published in 1979<sup>4</sup>. The people surveyed lived in different parts of the country, but the sample was not nationally representative. The overall incidence of malnutrition was 7% (mainly wasting, anaemia, or vitamin deficiencies) and was twice as great for those aged 80 years and over compared to those aged under 80 years. The majority of this group had medical conditions which played an important role.

Malnutrition arose from a combination of social and medical factors. The medical factors included poor dentition, partial gastrectomy and mental illness. Malnutrition was also associated with those who had lost interest in preparing food because they were housebound, had been recently bereaved or were men living alone. Also at greater risk were those in Social Classes IV and V.

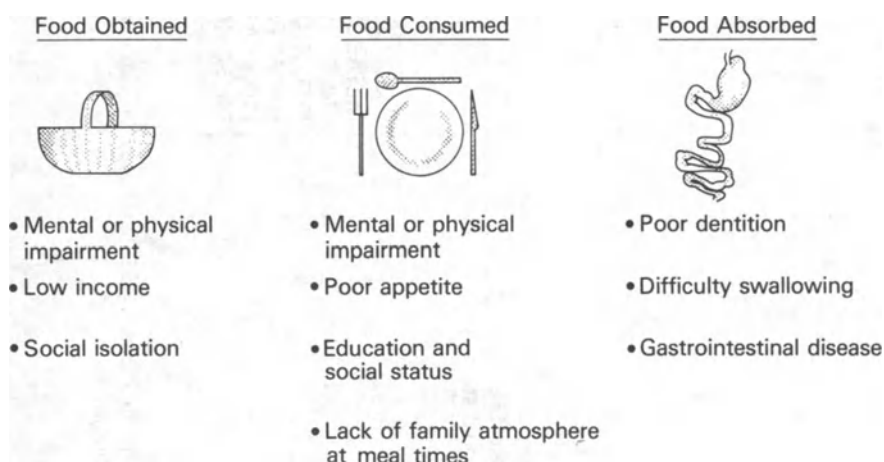
The diets of those who were malnourished were of a poor quality with lower mean intakes of animal protein, vitamins C and D and nicotinic acid. In the case of those who are housebound, lack of sunshine may add to the problems of shortage of vitamin D.

The factors which may influence nutrition in the elderly are wide-ranging, complex and inter-related (see Figure 8.6). Meals on wheels can be called on to deal with problems of malnutrition, but informal help with shopping and preparing meals can be invaluable, as can help with transport to luncheon clubs when these are available.

## **MENTAL ILLNESS IN ELDERLY PEOPLE**

The sub-group of elderly people with symptoms of mental disorders presents a major problem in providing care.

A wide variety of terms and labels are applied to the elderly with mental illness. Elderly people manifesting symptoms such as deteriorating memory, intellectual impairment or abnormal behaviour are often described as suffering from 'senility', 'confusion' or 'dementia'. For purposes of planning and allocation of resources within the service, the elderly with mental illness are classified as: 'elderly with mental illness' (EMI) or 'elderly with severe mental illness' (ESMI). General diagnostic or administrative labels of this sort are unsatisfactory for a number of reasons. They are vague and



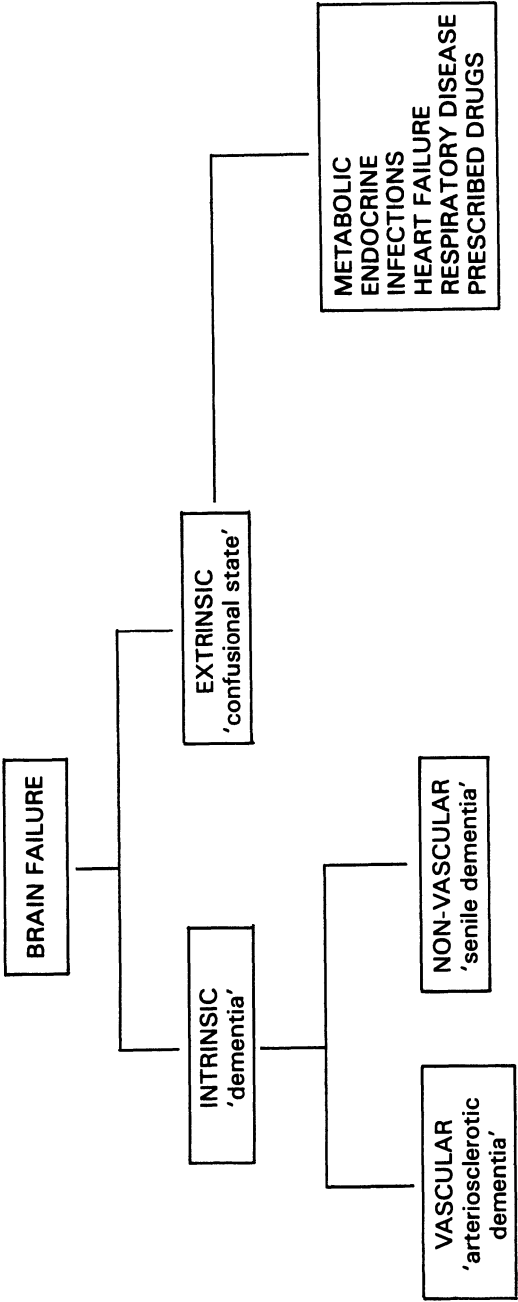
**Figure 8.6** Factors affecting the nutritional status of the elderly

imprecise and they tend to group together patients who may be suffering from different underlying conditions with different aetiologies and prognoses. Moreover, some terms such as 'senility' have an everyday meaning which is deeply insulting and stigmatizing.

Mental illness in the elderly can be described in three broad groups:

- (1) acute confusional state;
- (2) dementia;
- (3) mental illnesses of the types which may also occur in younger age groups.

Recently, attempts have been made to include the former two groups of mental illness in a classification based on the concept of brain failure (Figure 8.7). Brain failure is the consequence of diffuse disease



**Figure 8.7** Types of brain failure. Source: Modified from Gray and Isaacs (1979). *Care of the Elderly Mentally Infirm*. (London: Tavistock)

affecting either the whole brain or large areas of it and is of two main types: extrinsic and intrinsic.

*Extrinsic brain failure* embraces the traditional concept of the acute confusional state in which, though there are no major structural changes in the brain, its function is disturbed by disease or abnormality in other body systems. A wide range of factors may contribute to this disturbed brain function in the elderly, some of which are shown in Figure 8.7. Infections such as those of the urinary tract, skin or pneumonia, disturbances of body fluids and electrolytes, vitamin deficiencies, failure of the heart or respiratory systems or medications (such as barbiturates or digitalis) may be involved.

The symptoms and signs of extrinsic brain failure include alteration of consciousness, delirium, hyperactivity and even hallucinations. The essential approach to management is to identify the underlying disease (or other) 'extrinsic' process and treat it. In the majority of cases the manifestations of brain failure will then be reversed.

*Intrinsic brain failure* encompasses the clinical syndrome of dementia and differs from the extrinsic form in that definite structural changes are present in the brain of the elderly person. This 'intrinsic' form can be viewed as comparing two types of underlying processes (Figure 8.7).

In the *vascular* form, previously called 'arteriosclerotic' or 'multi-infarct' dementia, the underlying process is a destruction of numerous small areas of the brain through loss of blood supply arising from haemorrhage or thrombosis. There is a step-like deterioration in brain function and behaviour with each fresh episode. There may be periods during the day when the patients are fairly rational, but there tends to be deterioration towards the end of the day.

The *non-vascular* form, previously called 'idiopathic' or 'senile' dementia arises from the depositions in the brain of two types of microscopic lesions: plaques and neurofibrillary tangles. The reason for the accumulation of these lesions in the brain is not known but they appear to occur, to some extent, in the brain of most people from middle-age onwards. In a proportion of elderly people they become widespread and produce symptoms.

A wide spectrum of manifestations of intrinsic brain failure may be present. The vascular form may have a sudden onset whilst the non-vascular form is characterized by a slow and remorseless deterioration.

There is a history of gradual deterioration of memory at first for recent events, but later long-term recollections become confused. Associated behavioural changes such as losing personal belongings and wandering from home, particularly at night, can give rise to great concern. Deterioration in intellectual ability results in increasingly



poor performance in dealing with problems of everyday life. Irritability, aggressiveness, tactlessness, apathy are the hallmarks of behavioural changes which present problems not only for the old person, but for those with whom he or she has contact. The condition may progress to loss of intellectual functioning, grossly abnormal behaviour and unresponsiveness. It may take months or years to arrive at this stage.

Concern with the problems of brain failure in the psychiatry of old age has tended to overlook the fact that elderly people are also subject to many of the same psychiatric problems which affect younger age groups. Problems such as depression, neuroses, schizophrenia, suicide and parasuicide occur in the elderly, although the factors that provoke them and their features may differ to the extent that they need a different approach from the psychiatry of younger age groups.

### **The size of the problem**

The precise frequency of mental illness amongst the elderly in the UK is not accurately known, but estimates are based on inferences drawn from surveys conducted in different geographical areas. The British surveys most quoted are those which were carried out in Newcastle-upon-Tyne in the early 1960s<sup>5</sup>.

Whatever the precise frequencies of mental disorders in the elderly three main themes emerge from surveys of elderly populations.

- (1) The proportion of illness and incapacity is high in the institutional elderly population, but in numerical terms the problem is greatest in the community.
- (2) The incidence of the mental illness of old age increases with advancing years. The practical implication is that current demographic trends will cause the number of very elderly to increase disproportionately, with a large corresponding increase in the number of mentally ill elderly people.
- (3) A high proportion of these problems in the elderly are unknown to the services. This 'unmet need' is not exclusive to the elderly, but is most serious in this group of the population.

### **Management of the patient**

The majority of patients live at home. The major problem arises for those people who live alone without family support, where often there may be no alternative to admission to an institution. For patients who receive care from their family a strong case exists for providing support to prevent total breakdown. The elderly person with intrinsic brain failure places a substantial burden on relatives. Disturbed sleep and

severe restrictions on social activities are some of the problems families have to face in coping with an old person who may be incontinent and exhibit dangerous and irresponsible behaviour. If the situation could be alleviated the need for permanent admission to an institution could be lessened. The range of supporting services in the community include home helps, social work, laundry services, day-care, night-sitting, and holiday relief. If properly deployed these services have the potential to prevent the family becoming overwhelmed by the problems and the patient then having to be admitted to an institution. Nevertheless, where family relationships are being destroyed by devoted care, institutionalization is a humane option.

Most local authority homes for the elderly contain a proportion of people with varying degrees of intrinsic brain failure. Such residents, particularly when they exhibit grossly abnormal behaviour or aggression, can be very disruptive to the running of the home.

In some parts of Britain specialized homes for the elderly mentally ill have been developed, with higher staff to resident ratios. The issue of whether confused old people should be maintained in segregated homes is difficult to resolve in the absence of evidence of the effect of different institutional regimes and environment on residents. Some commentators are firmly of the view that integration should take place, so that the confused elderly residents benefit from mixing with their non-confused counterparts. This approach may undervalue the extent to which the behaviour of severely confused residents causes disruption and distress in the lives of the non-confused residents. Moreover, it may overestimate the extent to which a particular environment can influence the natural history of dementia in the elderly.

The development of hospital services for the psychogeriatric patient is in a state of transition. The provision of a separate 'norm' of in-patient provision for the elderly mentally ill has been a part of recent government policy, but it appears to be held at the level at which demented patients occupied mental hospital beds in 1971. In addition, as with norms for geriatric beds it is related to the base population aged 65 years and over and does not take into account the heterogeneity of the elderly population, so it is set at too low a level.

Growing interest in psychiatric care of the elderly has led to special arrangements for the treatment of so-called 'psychogeriatric' patients in many parts of the country. Appointments of consultant psychogeriatricians or consultant psychiatrists with a special interest in the psychiatric problems of the elderly have meant that it is easier (in areas where they exist) to deliver a comprehensive service to the elderly mentally ill.

In some districts, joint psychogeriatric assessment units have been established in which a consultant geriatrician, together with a

psychiatrist with special expertise in the mental illness of old age, receive admissions from the community. Other personnel of a multi-disciplinary team (e.g. social workers) will usually also be involved.

The purpose of such units is to serve as a place where diagnosis, assessment and initial treatment is established. A judgement about eventual placement (e.g. community or long-term care) is made during this initial admission, which is usually limited to several weeks in duration. This model has been criticized because it requires an old person to be admitted twice. Firstly, to the assessment unit, then discharged and re-admitted to the final care base.

In districts where such units have not been established, arrangements vary considerably from place to place. In many, links have evolved between geriatricians and psychiatrists which, whether formal or informal, serve to facilitate management of this group of elderly patients. In other districts, for historical or geographical reasons, no such relationships may exist and elderly people with mental illness may be dealt with independently by geriatricians and psychiatrists.

The day hospital is another important component of a psycho-geriatric service and in some parts of the country other innovations such as community psychiatric nurses have been introduced.

## **SERVICES FOR THE ELDERLY**

It often surprises people to learn that the majority of elderly people are able to lead an independent existence in their own home. However, with advancing age and the impact of the negative forces of old age, this independence is only tenuously maintained. When elderly people are no longer able to manage on their own, a wide range of services are available to provide help, support or advice. In general, these services are provided by four main agencies: health services, local authority departments, social security offices, and voluntary bodies.

For some considerable time the central objective of policy for care of the aged in the United Kingdom, recognizing the need to ensure the maximum independence and self-determination, has been to enable elderly people to remain in the community for as long as possible. There seems little doubt that the great majority of old people would prefer to remain in their own homes in familiar surroundings. The role of services is to recognize the need for support and to provide an appropriate type and level of care at the right time. Moreover, decisions must be made on the question as to whether or not it is reasonable, on humanitarian or economic grounds, to continue to maintain an elderly person in his or her own home, and to decide upon the time when some form of alternative care is necessary.

## Health services

### *Primary care*

Over the last decade major changes have occurred in the organization of general practice. It is now uncommon to find general practitioners in single-handed practices and the move towards group practice has also been accompanied by the tendency to practise from purpose-built premises.

General practitioners receive additional payments for people aged 65 and over and further enhancement for those aged 75 and over registered with them: this recognizes the greater demands made by elderly people on their services. Not all innovations in the organization of general practice have been to the benefit of the elderly persons. The appointments system which is now widely employed can be confusing for the elderly person. The tendency of general practitioners to cut down on the number of home visits they make serves to diminish contact with their elderly patients; moreover, the move in the direction of group practice facilities has often led to the closure of branch surgeries which many elderly people would relate to more easily than to large, centrally placed health centres. Nevertheless the move towards group practice has seen a parallel development in the primary health care team, which is of great potential benefit and the cornerstone of medical care of old people in the community. Traditionally the first contact is made with the family doctor, but other members of the primary care team – district nurses and health visitors – provide help and advice.

Although the health visitor is mainly concerned with the youngest age groups, a proportion of her case-load may be taken up with the elderly. Indeed, her potential role in education and prevention amongst the elderly is of major importance. With her training she is equipped to detect early signs of diseases and disability and take the necessary action to ameliorate these conditions. A knowledge of the complex network of services available could enable her to marshal the assistance that is needed, especially in cases where old people live with their families. Here her position as a family visitor can be of particular help. Some health visitors may have direct links with the local hospital geriatric department, giving them a wide range of contacts. Although over half a million old people are visited each year by health visitors in England, this still represents only 13% of the cases they attend. There is undoubtedly considerable variation throughout the country in the extent to which health visitors either perceive as appropriate or actually carry out a function in the care of the elderly.

Home nurses provide nursing services in homes, some with poor facilities. There is little doubt that without this service, admissions to

institutions would be considerably higher. Of all patients treated at home by nurses in the United Kingdom over 40% are elderly, but because the conditions from which the elderly suffer are often chronic, this means there is an even higher proportion of the district nurses' time spent on nursing old people. In England in 1980 over one and a half million elderly people were attended (43% of their case load). In some areas, although overall responsibility remains in the hands of the qualified nurse, nursing auxiliaries assist with some duties such as bathing, washing hair, cutting toenails and generally performing home-nursing tasks. Where housing facilities are poor, arrangements can be made to transport the old people to public baths. Sometimes district nurses pay evening visits ('tucking-in service') and in a few places a 24 hour nursing cover is available in the community.

It is well known that many elderly people who are ill or incapacitated do not seek medical help. A primary health care team can organize itself in such a way that some of this need is ascertained and problems are recognized early, by surveillance of the entire elderly population of the practice. This is most easily performed where the practice has established an age-sex register.

### *Hospital in-patient and out-patient services*

In keeping with other age groups the elderly may be treated in many specialties, such as general medicine, general surgery, orthopaedics, gynaecology and psychiatry, as in-patients or out-patients within NHS hospitals. Indeed, as the population ages most hospital departments find themselves dealing with a higher proportion of elderly patients.

The mainstay of the hospital care of the elderly is the departments of geriatric medicine which have evolved slowly since the NHS was established in 1948. Out of approximately 370 000 beds in the NHS hospitals in England, 55 000 are in departments of geriatric medicine. Many of these are still housed in older hospitals in accommodation which is inferior to that provided for other specialties. In its early days, geriatric medicine operated as an agent of secondary referral: taking over elderly patients for continuing care or rehabilitation after the acute episode had been dealt with in the general medical or surgical wards. The development of geriatric services has been patchy throughout the country (northern industrial areas in particular, for example, have tended to be under-provided) and local patterns of geriatric care vary greatly.

In some parts of the country, the model is still predominantly to accept cases from acute general hospital specialties. Latterly, a modern geriatric service has come to be regarded as one which deals with all aspects of hospital care of the elderly, including acute illness. In some parts of the country, therefore, all patients over a certain age (over 65

years or more commonly over 75 years) are accepted by the geriatric service by direct referral from general practices. The acute episode is treated by the geriatric physician who also assesses the patient's suitability for discharge, rehabilitation or long-term care and organizes these alternatives.

Even if an age-defined model of geriatric care is not fully operational, in many places over recent years there has been a move to site more geriatric beds within district general hospitals (DGHs). In this way a full range of diagnostic, treatment services are available and provide the key to the initial assessment and management of the acute episode in the elderly patient. The most successful arrangement for providing geriatric services (in which waiting lists are small and the need for continuing care and long-stay reduced) appears to depend less on the absolute number of geriatric beds than on the balance between the number of such beds in district general hospitals and those in peripheral geriatric hospitals. Successful services are usually those which have a relatively generous endowment of beds within general hospital facilities.

Most departments of geriatric medicine thus have abandoned the purely custodial care approach to the elderly. Instead, they aim through accurate diagnosis, active treatment and rehabilitation to return the old person to the community with the necessary supporting services. The service usually includes the following components: (a) acute facilities, (b) rehabilitation facilities, (c) long-term care facilities, (d) day-care facilities and (e) out-patient medical care. Rehabilitation will usually involve a multidisciplinary team consisting of geriatricians, nurses, occupational therapists, physiotherapists, and social workers. The elderly are re-trained in physical and social skills to increase their independence so that they may then be discharged into the community with adequate support, often on a trial basis. Geriatric beds are sometimes used on a rotating basis with patients in hospital for, say, 4–6 weeks and then at home with relatives for the same period. As a relief to relatives, accommodation can be offered to the elderly person over a holiday period. Most geriatric services also maintain a proportion of beds which are used for long-term or continuing care for the small minority of patients who require constant medical and nursing supervision and where rehabilitation has failed or is considered to be inappropriate. Such patients may be moved to peripheral geriatric units near to their previous home or the home of their relatives. Very few patients in such hospitals will ever be discharged home and most of them will die in this setting.

### *Day hospital care*

The day hospital now has a firmly established place in most geriatric

services. It should be clearly distinguished from the day centre for the elderly, which is provided by the social services department, sometimes in association with a voluntary organization, and caters largely for the elderly person's social rather than medical needs. Day hospitals usually operate 5 days per week, patients generally arriving early morning and departing mid to late afternoon, and having their mid-day meal at the hospital. The day hospital is often situated close to or within a hospital which has geriatric beds.

Patients travel to day hospitals from their own homes each day and in addition, geriatric in-patients may also attend. The emphasis in day hospitals is on active treatment and rehabilitation, and again the approach is one of multidisciplinary team work. Physical rehabilitation may be achieved by nurses, physiotherapists, occupational therapists and speech therapists, working together with geriatric physicians; medical assessment and diagnosis is also a feature. Additional services such as chiropody, dentistry, dietary counselling and hairdressing are available, and other activities include handicraft, games, entertainments and the fostering of happy social relationships. The day hospital has proved a useful addition to the geriatric services in that it may prevent unnecessary admission to hospital beds and allow the old person to be investigated and treated without being admitted as an in-patient. It also permits earlier discharge from a hospital bed so that rehabilitation continues alongside reintegration into the community, and thus the risks of relapse and readmission are reduced. Moreover, the day hospital can be an invaluable aid to families who are sharing the burden of care of an elderly relative with the statutory services. One of the major drawbacks to providing day hospital care on a wider scale is the difficulty and expense of providing transport.

### *Community hospitals*

The term 'community hospital' is used to describe a small hospital supplying the needs of a local community, dealing with patients who do not require the full range of specialist facilities provided by a district general hospital. The community hospital concept has been part of Government policy for some time and is seen as an important facet of the services providing care for the elderly. They are envisaged as acting as an extension of the primary care service, with general practitioners having responsibility for admission and discharge, supported by consultant geriatricians as required. Elderly patients would be those requiring longer-term care, but too infirm to be cared for in residential homes or at home (even with full domiciliary support). Beds would also be available for patients to be admitted and discharged to provide temporary relief for relatives.

The extent to which community hospitals have been established

throughout the country has been very variable and it is too early to judge the success of the concept against the background of reservations held about it.

### *Chiropody*

Problems with the feet can severely curtail the mobility of old people, which in turn creates other difficulties such as increased isolation. A chiropody service is provided by district health authorities, and although levels of provisions vary considerably throughout the country, a variety of arrangements exist ranging from home chiropody when the old person is housebound, to clinics in convenient places such as day centres, hospitals, health centres and health clinics. A major part of the chiropody service is still based on the private chiropody practitioner who contracts out this service to the NHS.

### *Aids and equipment loans*

Health authorities provide a wide variety of aids and equipment on free loan to assist the nursing of the elderly at home. The range includes bed pans, commodes, bed cradles, beds, hydraulic or electric hoists and wheelchairs. Non-returnable items are also supplied, such as sterile dressings and incontinence pads. Certain items of equipment of a complicated nature, such as individually designed wheelchairs, are obtainable from central government sources (see Chapter 5).

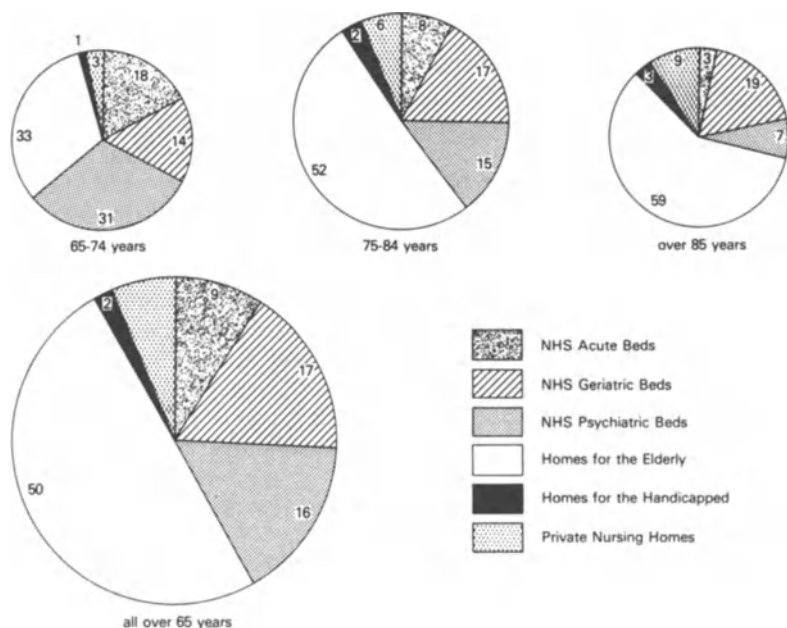
### **Local authority services**

#### *Residential accommodation*

The power to provide residential accommodation for the elderly is laid down in Part III of the National Assistance Act 1948, and hence is often referred to as 'Part III Accommodation'. The Act states that the local authority has a duty to provide for "those who by reason of age or infirmity are in need of care and attention not otherwise available". Initially, much of the residential accommodation provided by local authorities was in buildings which had been poor-law workhouses. Many of these have now been replaced by new purpose-built homes with accommodation for between 30 and 60 residents.

All such accommodation is now the responsibility of the local authority social services department, and it currently consumes some 25% of the entire social services budget. The number of residential places available for elderly people is determined by government issued 'norms', which take account of the number of people aged 65 and over in a given area. The current norm is 25 per 1000 over 65s. There is often great variation in the extent to which this level of provision has been achieved in different parts of the country. In January 1949, there were





**Figure 8.8** Percentage distribution of elderly people in different types of care in Leicestershire, by age. Source: Donaldson, L. J. (1981). A demographic tidal wave. *Geriatr. Med.*, 11, 81-84.

40 000 old people in local authority accommodation in England and Wales; in 1980 a total of 165 900 people aged 65 and over were living in residential accommodation. Of these places, 109 700 were provided by local authority social services departments and the remainder by private or voluntary agencies. In one health district, taking into account all elderly people in any form of institutional care at any one time, almost 50% (Figure 8.8) were found to be in residential accommodation, provided mainly by local authority social services departments. In the oldest age groups this figure was higher than 50%. This is in contrast to that proportion in NHS geriatric beds which stays constant and the proportions in acute or psychiatric beds, which fall in the oldest age groups.

The request for admission to a home for the elderly does not usually emanate from the old people themselves. Generally, the need for such care is identified by the social worker or family doctor, perhaps under pressure from relatives or neighbours, or by a hospital consultant who wishes to discharge the old person from hospital, but nevertheless feels

that the patient is not able to manage in his own home. Whether or not a particular person is admitted to residential care depends to a great extent on the opinion of the social worker and the officer in charge of the home as to their degree of incapacity. There is great variation in what levels and types of disability different homes are prepared to accept. Most homes for the elderly maintain a quota of short-stay places which can provide temporary relief for the elderly person's relatives; they may provide a rehabilitative function or allow the elderly person to be assessed for suitability for permanent admission. For the majority of elderly people admitted to residential care, however, the move is permanent, with the resident giving up his own home usually within 6 weeks of entering care.

Residential homes for the elderly are staffed by the social services department; an Officer in Charge with assistants. Some of these members of staff will have had some experience in the nursing field, whilst others will have a background of social work. The aim of such homes is to allow the elderly resident the maximum dignity and self-determination. As such, residents may have their own rooms and may be encouraged to maintain their possessions and take part in recreational activities. Minor illnesses would normally be cared for by the staff of the homes, with support from the general practitioner. If serious illness develops it would be usual to transfer the patient to hospital. In practice the daily routine for elderly people, particularly those who are immobile or otherwise incapacitated, can often seem dull and monotonous with long periods of time spent sitting in a chair doing nothing.

### *Housing*

There is little doubt that adequate and properly designed housing is the foundation on which medical and social services for the elderly should be built. Most of the special accommodation for the elderly has been provided during the last 20 years. A booklet entitled *Flatlets for Old People*, published by central government in 1958, encouraged local authorities to provide flats with a warden. Over the years the design of special accommodation has been improved. The original booklet, for example, advocated open fires because it was thought that old people liked the warmth, comfort and appearance of a coal fire. However, subsequent experience showed that old people quickly learned that they were better off without the chore of cleaning out the fire, and preferred the more even warmth and cleanliness of central heating. There is, of course, the additional bonus of increased safety.

Approximately a quarter of local authority building programmes consist of special housing. Not all the special housing for the elderly is warden controlled, but where it is, it is known as sheltered housing. It is

provided not only by local housing authorities (district councils) but also by voluntary housing associations. There is considerable confusion amongst health professionals, relatives and even elderly people themselves, about the role of wardens. Essentially the warden acts as a friendly neighbour and keeps regular contact by personal visits, encouraging the elderly resident to contact him or her by means of some communication apparatus, e.g. buzzer, bell or two-way speaking system. The warden does not provide a personal service such as cooking, cleaning or shopping, but can obtain help when necessary by providing a point of contact through which health and social services can be delivered. Sheltered housing is an important form of provision which allows frail, elderly persons to continue to live in the community. Without such protected environment, in which they can maintain supervised independence, they would probably be unable to cope, and the only recourse would be towards institutional care. In some places local housing authorities and social services departments are working together to provide a greater degree of care to the more dependent residents living in sheltered housing in order to avoid the need for admission to old people's homes.

#### *Day centres and recreational clubs*

Unlike day hospitals, day centres do not have therapeutic facilities, but are generally intended as places where frail elderly people can interact with others like themselves and with social service staff, thereby providing a stimulus for contact and a relief from loneliness. A hot meal is usually provided at mid-day which helps to meet nutritional needs. In some cases attendance by an elderly person at a day centre can provide relief for relatives who otherwise provide constant care. Aside from day centres provided by local authority social services departments, many recreational centres for fitter elderly people are provided by voluntary organizations, and neighbourhood groups. Such facilities, by developing contacts with members of a group which is not quite so elderly could, it is thought, slow down deterioration in later years.

#### *Home help services*

Over 700 000 elderly people received assistance from the home help service in England and Wales during 1980, and this has increased markedly over the last decade. The home help service is the major community service for the elderly provided by the social services department. After referral by a general practitioner or social worker the home help organizer will visit the elderly person's home to assess their needs. A payment is made according to means, but in many cases the service is provided free of charge. The home help undertakes house-

hold duties, such as cleaning, washing and shopping as well as errands, for example, collecting pensions or prescriptions. Most importantly she provides a link with the outside world and not infrequently acts as the sole regular support to an elderly person living alone. Some authorities provide short courses of training to allow home helps to recognize deterioration in physical or mental status of an elderly person. By her maintenance of contact with the general practitioner, health visitor, home nurse and social worker, the home help is uniquely placed to draw attention to the need for intervention.

### *Meals services*

Meals on Wheels – hot meals prepared in central kitchens and delivered by car or van to the homes of elderly people – provide another major component of the system of community care for old people living in their own homes.

The service was pioneered initially by the Women's Royal Voluntary Service (WRVS) who, together with other voluntary bodies, still undertake a considerable amount of work in this context, with some financial support from local authorities. The local authority social services department itself also supplies a meals on wheels service, but in most cases the service is not provided every day, but two or three days a week. Meals are also provided at luncheon clubs, day centres and old people's homes for elderly people who are able to travel from their own homes. There are just over 40 million subsidized meals served to the elderly each year in England and Wales. Just less than half are 'meals on wheels', received by about 2½% of the over 65s.

### *Aids and adaptations of dwellings*

Home adaptations can do much to maintain the independence of old people and prevent deterioration into ill health. Adaptations to property like the widening of doorways (for wheelchairs), the provision of handrails, the installation of a downstairs lavatory, or improved heating, all may be organized by the social services department. Moreover, aids to daily living such as special kitchen or garden utensils, telephones or alarm bells may also be arranged, perhaps after assessment by an occupational therapist.

### *Laundry services*

In some places free laundry service is provided for sheets and other items of clothing, particularly for incontinent patients.

### *Social work service*

Part of the case-load of social workers is taken up by elderly clients. This applies to both social workers working in hospitals and those in

the community. Much of this load is currently shared with social work assistants. Referrals for social work help on behalf of an elderly person can come from a wide variety of sources: a hospital consultant, a general practitioner, a health visitor, a relative, the police force, a concerned neighbour or a voluntary worker. Social workers make assessments on the basis of visiting and interviewing elderly people in their own homes, by interviewing relatives or neighbours and seeking medical opinion from the general practitioner or hospital consultant. In most cases they maintain this contact with the elderly people and co-ordinate any support that might be needed for them and their family. Less commonly they may arrange for admission to residential care.

### *Services for the blind and deaf (see also Chapter 5)*

Sensory loss is particularly common amongst the elderly and can serve to impair communication, decrease mobility and worsen isolation. Some 86 000 people aged 65 years and over were registered as blind in England and Wales in 1980; nearly 66 000 were aged 75 years or older.

Social services departments have on their staff special social workers for the blind and partially-sighted, who can provide advice about services and supply aids such as talking books, newspapers and radios; or they can arrange attendance at day centres, clubs, rehabilitation centres and holidays. This work is often carried out in conjunction with one of the voluntary societies for the blind. Elderly people who are deaf also cause concern, especially since loss of communication can be mistaken for mental infirmity. Although hearing aids may be supplied by the NHS, facilities for ensuring that they are used correctly are frequently inadequate.

### *Other services*

A diversity of other types of service to elderly people in the community exists in different parts of the country. Some innovations have been developed by social service departments, and others by voluntary organizations. Often these schemes utilize volunteers from neighbourhoods where older people live. For example, the street warden scheme is in operation in some parts of the country. Usually a warden covers a street where he or she lives and informally supervises the elderly people living there. Many local schools or youth organizations include a component of community work whereby students will visit and form a link and provide help and companionship to an elderly person. In some places good neighbour schemes have been established and the local authority pays a small amount for a person to supply a meal to an elderly neighbour.

**Voluntary services**

Many voluntary associations devote part or all of their energies to the care of the elderly. Organizations such as the Centre for Policy on Ageing, Age Concern or Help the Aged are national organizations, the latter two with branches throughout the country. In addition, many hospitals have leagues of friends and even more informal groups of workers who devote time to the care of the elderly. Many of the services provided by voluntary agencies complement and are supported by the statutory services. Financial contributions from the social services departments budget to the meals-on-wheels service has been mentioned as have the provision of clubs, homes, organization of holidays, loans of equipment, foster schemes, chiropody and help with gardening.

**Social security and financial support**

The main cash benefit to elderly people in the United Kingdom is the State Retirement Pension, which about 8½ million receive. In addition, about 1.7 million of these pensioners who are entirely dependent on a State pension with little additional resources receive a supplementary pension, which is assessed in accordance with their needs. Furthermore, single supplementary benefit payments can be given to meet special needs such as heating and the purchase of furniture and clothes. Other indirect help is given to old people in the form of rent and rate rebates. There are special rates on public transport and reduced prices for entertainment and services like hairdressing or dry cleaning. Elderly people who are handicapped and living with their families or in private homes and require a lot of care may be eligible for special allowances (see Chapter 5).

**Co-ordination and planning**

Since reorganization of the health service in 1974 collaboration between health authorities and social services departments has been formalized to enable an assessment to be made of the needs of, and the co-ordination of the delivery of services to, individual client groups such as the elderly, the handicapped or the mentally ill. Joint Consultative Committees comprising members both of the district health authorities and the county councils advise on services which require such a joint approach to planning, although they have no executive powers. Nearly all health districts have set up planning teams for the care of the elderly. These teams are responsible to the district management team for planning a comprehensive and coherent service for the elderly within the district. The membership usually includes a community physician, an administrator, a nursing officer, a geriatrician, a general practitioner, representatives of the social services and, sometimes, other health professionals concerned with the

elderly, as well as representatives of voluntary agencies. There is little evidence that the high expectations from these arrangements have been met in many districts.

### COMPULSORY ADMISSION

Powers exist under the National Assistance Act 1948 for the local authority to arrange compulsory removal to hospital or other institution of a person who is unwilling to go voluntarily from their own home. A person can be removed if he or she is suffering from grave chronic disease or because of being aged, infirm or physically incapacitated is living in insanitary conditions and hence unable to devote to himself or herself, and/or receive from others, proper care and attention. Details of the procedure are laid down in Section 47 of the National Assistance Act 1948. A 'proper officer' (usually a community physician) and another registered medical practitioner (usually the patient's general practitioner) must certify that such removal is in the interests of the patient or that it would prevent injury to the health of, or serious nuisance to, other people. The next step is for an application to be made to a Magistrate's Court and for the patient to be given seven days' notice.

In 1951 an incident exposed a weakness in the procedure and highlighted the need for more immediate intervention. An elderly lady in Yorkshire fell in her house, refused to go into hospital and rejected other help. She lay on the floor for the statutory 7 days watched by officials powerless to act. Her pressure sores became infected and she subsequently died from tetanus. The local Member of Parliament was appalled by the affair and introduced a Private Members Bill which became the National Assistance (Amendment) Act 1951 which introduced an emergency procedure permitting the two doctors mentioned above to make an application to a magistrate and the patient is removed *immediately* for a period of 3 weeks. This latter procedure is now used almost exclusively.

'Suitable' accommodation in practice is usually a hospital, but this need not necessarily be the case. However, the managers of any accommodation must consent to receiving the patient. If the period of detention needs to be extended then an application must be made to the Court, though this is very seldom required.

Unlike compulsory admission to mental hospitals where detailed statistics are available, no information is collected routinely about the use of Section 47. The only available data come from a few published surveys.

A recent survey in England and Wales<sup>6</sup> estimated that each year about 200 people were removed compulsorily (two-thirds to hospital);

about 97% of whom were over the age of 65 years. This gives an incidence of only 3.6 per 10 million of the total population and there is tentative evidence that the rate is decreasing. This would be in keeping with experience with compulsory admission to mental hospitals. However, there is no doubt that a number of elderly people are persuaded to leave their homes under threat of compulsory action.

Surveys also show that a high proportion of patients die soon after removal and for the remainder there is little chance of returning to their own home.

There has been recent concern about the infringement of personal liberty involved in these procedures. On the other hand, the potential benefits are difficult to quantify – such factors as the relief of distress, pain and suffering following admission to a caring environment.

## **OVERVIEW OF SERVICES FOR ELDERLY PEOPLE**

The modern view of the care of the elderly recognizes the spectrum of care through which the appropriate level of support is matched to need, as early as possible after complete independence is lost. The components of this spectrum as they have been described at present, can be identified broadly as community services, sheltered housing schemes, residential homes, and hospital care.

### **Care in the community**

Adjusting the balance of care to the community, in theory, could go some way to ameliorating the effects of the impending increase in the elderly population on the demand for residential care and hospital services. The term ‘community care’, however, encompasses a wide variety of services, only part of which is statutorily provided by a wide variety of agencies. In practice there is generally little attempt to develop a truly integrated approach to the delivery of support to old people in their own homes. There is little doubt, however, that in the immediate future there will be no change in the policy that more emphasis should be placed on community care.

The idea that elderly people should be maintained in their own homes for as long as possible is beyond reproach. However, a note of caution should be sounded: the motives of those who cry for more resources to be diverted to the community are not always altruistic. The community is seen by many as a way of cutting the costs of expensive residential care. Community care, however, may not be the cheap option that many people believe it to be, and to do it properly may be an expensive, if ultimately worthwhile, exercise. In Scandinavian countries, which are often depicted as models for which to strive in providing care for the elderly, home helps are available six hours a day,



seven days a week and meals-on-wheels are also an everyday event. In developing services for old people at home it is important to look carefully at the way existing services and staff are deployed. It is often said by professionals caring for the elderly that some old people receive meals-on-wheels, visits from home nurses, health visitors and voluntary workers, while a more disabled counterpart receives fewer of these services. It is important that such services are properly co-ordinated, that the people working in them have a clear idea about the limits of their responsibility, and that the services are designed primarily with the needs of the elderly in mind. If a service is no longer needed, it should be stopped.

### **The future role of the residential home**

The home for the elderly has traditionally been the place where the older person who is unable to function in the community can spend his or her remaining years in care. The bleak and depressing picture of the lives of residents in such homes, which emerged in reports in the early 1960s, led to an increase in the number of purpose-built residential homes in which greater emphasis was placed on the quality of life of the residents. Ironically, however, at a time when staff are better orientated towards the residents' social needs, the physical characteristics of their residents have changed dramatically. Residential homes for the elderly are now being called upon to care for more elderly, and hence more disabled, residents. This is in a setting where staffing ratios and training compare unfavourably with those of the hospitals. There is evidence that the geriatric hospitals, when faced with a similar increase in demand because of the ageing population, are choosing to select patients who have greater potential for rehabilitation and thus earlier discharge. It is the role and relationships between residential homes for the elderly, largely run by the social services department, and the geriatric services where many of the future problems may arise. If homes for the elderly are to be required to deal with a greater number of highly dependent patients, then they must be staffed and equipped to cope. There have been suggestions for developing accommodation in nursing homes jointly run by the health service and social services, and for establishing sick bays in local authority residential homes.

Many of the problems of lack of cohesion between the different organizations providing services for the elderly could be solved by evolving a common method of assessment. In many parts of the country criteria for admission to residential homes differ greatly, and few have a medical input to this process.

**Alternative models for organizing geriatrics**

A number of solutions have been put forward to rationalize the hospital care of the elderly and they can be broadly summarized as two options:

- (a) the integration of geriatric medicine with general medicine;
- (b) the creation of geriatrics as an age-defined specialty.

The evidence in the literature indicates that some local services operate using either model (a) or (b) to organize geriatric medicine. Wards run jointly by consultants in general and geriatric medicine have been reported and arrangements where geriatric physicians are 'attached' to general medical units are in operation elsewhere. In other parts of the country, the geriatric service takes responsibility for all elderly patients, the definition of 'elderly' varying, e.g. 65 years and over or 75 years and over.

The report of the working party of the Royal College of Physicians of London on the medical care of the elderly<sup>7</sup> made recommendations for a model of geriatric medicine involving its integration with general medicine. The recommendations see the fusion of all acute medical and geriatric facilities in the district general hospital, together with the appointment of Consultant Physicians "with a special interest in geriatric medicine" who should usually (according to local circumstances) have access to the same acute beds as their colleagues. Some physicians are also envisaged as holding contracts with a stated number of sessions devoted to care of elderly patients in rehabilitation or long-stay beds.

This proposal is a response to the inevitability and permanency of the ageing population so that, in theory, the burden of care would be shared. As the Working Party put it: "there should be a progressive integration of all acute hospital medical work so that an arbitrary age-barrier would no longer be necessary."

The model, whilst superficially attractive, will not be easy to implement. Much depends on the calibre and level of recruits to take an interest in the care of the elderly. The experience of geriatric medicine in its present form is not good in this context, although the very existence of such an integrated service is seen as improving training and interest in the problems of the elderly. However, this process will probably be slow and, in the interim, it is easy to imagine conflicts arising from the attitudes of consultants in general specialties towards the erstwhile geriatric physician sharing the medical care of all age groups.

Moreover, whilst the situation might prevent cries of 'misplacement' or 'bed-blocking' on acute medical wards, the situation may persist or even worsen in surgical and orthopaedic wards, where it is difficult to

imagine how a comparable model of generalist with special interest could develop. The creation of specialized geriatric-orthopaedic units, which have been implemented in some areas and advocated more generally, would introduce yet another dimension to the acute care of the elderly. The Working Party on the Care of the Elderly states as part of one of its recommendations: "physicians other than those with special interest in geriatrics and some surgeons should also have some access to long-stay beds, precise arrangements being decided locally". It is all too easy to see how this may be a tempting option for a surgeon pressed to admit from his waiting list to a bed containing an elderly person. If the elderly require a group with special expertise and training to deal with their problems, it is difficult to reconcile the physicians and surgeons who do not yet possess these special skills making the decision as to which elderly people do or do not require long-term care.

Indeed, much of the success of this model of hospital care of the elderly will depend on a change of attitude on the part of medical and nursing staff. If the notion of blocked beds is symptomatic of a deeply entrenched value system which recognizes a very limited place for care of the elderly in an acute hospital setting, then it is unlikely to succeed.

It is all too easy to imagine that, instead of true integration, an age-defined policy might operate at a ward level, with all elderly patients effectively being 'handed over' to the physician with an interest in geriatrics; hardly a course of action likely to foster interest or experience in the problems of the elderly in all medical and nursing staff. If a strong emphasis should continue to be placed on assessing, monitoring and maximizing functional capacity as well as treating underlying disease processes (an orientation of less relevance to younger age-groups), a mixed ward with different therapeutic goals may not be the optimum arrangement. Furthermore, if the physician with a special interest in the elderly is to involve himself in the acute medicine of younger age-groups this would seem to work against him maintaining a total community perspective to assessing and meeting the needs of the elderly.

The alternative approach to geriatric care is to take an age-limit as deciding the responsibility for care, rather in the same way that paediatrics is organized as a specialty. It would seem sensible given that the major population changes will be in the oldest age-groups and also the relationship of incapacity to age, to take this age-limit as 75 years rather than 65 years.

The age-defined service might be more effective in providing continuity of care between different types of geriatric hospital provision, day care and the community, all within the remit of a geriatrician. Provided that a continuing commitment was made to the siting of geriatric beds within district general hospitals, it need not suffer the

disadvantage of poor recruitment of staff.

Central Government attitudes on the matter seem to be unclear. A recent 'study' by DHSS officials<sup>8</sup> on the respective roles of the acute and geriatric in-patient services could see no set pattern for all districts. Their suggestion was that the integrated approach would be the best one where there were local difficulties in the recruitment of suitable individuals for consultant geriatric posts. This would seem the wrong emphasis on which to decide upon a particular option. There seems to be a genuine dichotomy over which course of action to adopt.

### **The role of the family**

One vital part of the equation not so far raised is the family, the most important 'community' resource. There is evidence that despite the increased geographical mobility of sons and daughters and changing attitudes generally most families feel an obligation to provide support to their older members. What is lacking is any firm commitment on the part of service providers to formalize the involvement of the family. Many families would certainly involve themselves to a greater extent if the burden of care was shared on a more widespread basis by regular relief in the form of day or holiday admissions. The question of direct financial subsidies to such families is another alternative which should be considered.

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## Communicable diseases and parasites

### INTRODUCTION

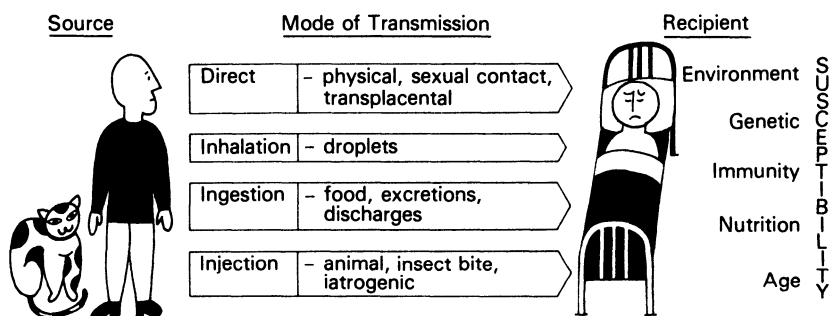
In 1965, Aberdeen experienced a large outbreak of typhoid fever in which over 400 cases occurred. The cause was quickly traced to one shop and to tinned corned beef which, it was discovered, had been cooled by immersion in the contaminated water of the River Plate in Argentina. *Bacillus typhi* had entered the tins by the seams and when the tins were opened the organisms multiplied. The tins had a code number and were withdrawn from sale, thus within two months the epidemic had ended. This episode illustrates how acute illness caused by a single agent acting for a short time can be rapidly brought under control. This is in stark contrast to many of today's diseases which are chronic and have more than one causative factor operating over many years. However, the control of infectious diseases is achieved only by strict adherence to a set of rules and by constant vigilance. The appearance of Lassa fever and Marburg disease in the last decade remind us that there can be unpleasant surprises in store.

Of course it is not possible to control the spread of all acute infections; for example, influenza. Other illnesses like tuberculosis are more complex in their origin. No-one will contract tuberculosis unless they have been infected with the tubercle bacillus. On the other hand, the majority of the population have been infected with the tubercle bacillus and most have had no apparent illness. If, however, adverse factors are operating on the infected individual such as poor nutrition and lack of adequate rest, then the disease may become established.

This chapter describes the principles of control of communicable diseases, defines some of the terms in common use, briefly outlines the services available to deal with infectious conditions and, in non-technical language, reviews the legal framework. Accounts are given of a selection of communicable diseases and health problems with parasites encountered in Britain.

## GENERAL PRINCIPLES OF CONTROL OF COMMUNICABLE DISEASES

Three elements should be considered when describing the spread of an infection: source, mode of transmission and susceptible recipient. Action to control an infection may be described against as many of these elements as appropriate (Figure 9.1).



**Figure 9.1** Spread of communicable diseases

### (1) *The source*

The source of an infection is often a person, so that removal of the source means isolation of the case. In many diseases its efficacy as a control measure is limited because a high proportion of the diseased population is asymptomatic, at least during the period when the disease is most infective. More radical action can be taken with an animal source, e.g. the destruction of rats in the control of bubonic plague.

### (2) *Mode of transmission*

Measures directed at the route of transmission are the key control

measures in certain diseases. For example, typhoid and cholera may be controlled by the efficient disposal of sewage and the supply of uncontaminated drinking water.

### (3) *Suitable recipients*

People can be protected from many infectious diseases by immunization, but as an approach to controlling spread, it is effective only in certain circumstances. In outbreaks of poliomyelitis, for example, vaccination is an important control measure because other approaches are ineffective whilst the vaccine is safe and highly protective. On the other hand, in dealing with an epidemic of cholera, the vaccine gives little protection and alternative measures are more effective.

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### *Causal agents*

Most communicable diseases in Britain are caused by either bacteria or viruses, and many of these pathogens have Man as their sole host. There are exceptions. The *Salmonella* group of organisms have reservoirs in many domestic and wild animals. Other examples are brucellosis in cattle and rabies in foxes. Viruses multiply only in living cells, and never in inanimate substances. Certain fungi may cause infection but most, such as *Monilia* (thrush), are mild and not life threatening except in circumstances where immunity is impaired. Medical parasitology includes the study of pathogenic protozoa, worms and insects, the first two groups often having reservoirs in wild or domestic animals, sometimes with insect vectors and complicated life cycles involving several hosts.

### **Modes of transmission**

A communicable disease may be transmitted by one or more of the following routes:

***Faecal-oral route.*** Excreta from the bowels of a case or carrier may be ingested by a susceptible individual through contaminated hands, toilet seats, door handles, food, milk or water. In some cases, the organism grows in the contaminated foodstuffs. Diseases that spread in this way include dysentery, typhoid, cholera and food poisoning.

***Nasopharyngeal route.*** Coughing, sneezing, talking or even the simple act of exhalation can expel organisms as droplets from infected nasopharyngeal passages; they are then inhaled by susceptible individuals. Moisture in expelled droplets less than 0.1 mm in diameter rapidly evaporates; if the contained organism is resistant to drying it may cause infection a considerable distance away, carried on the droplet nucleus.

Diseases spread by the nasopharyngeal route include chickenpox, diphtheria, measles, whooping cough and meningitis.

*Sexual contact.* Certain infections are usually sexually transmitted; these include syphilis and gonorrhoea.

*Direct contact.* Direct skin contact is the mode of transmission in diseases like scabies.

*Animal or insect bites.* Rabies and malaria are examples of a number of communicable diseases which are transmitted by the bites of animals or insects.

*Therapeutic procedures.* Blood transfusion or intravenous therapy may inadvertently transmit infection. The hands of surgeons or assistants, the air and contaminated dressings may harbour organisms capable of infecting operation wounds (e.g. Staphylococci).

*Congenital infections.* The fetus may acquire an infection from the mother during intrauterine life (e.g. syphilis, toxoplasmosis).

### *Portals of entry of infection*

There are four main routes through which infection can enter the body.

- (1) *Ingestion* – most gastro-intestinal infections.
- (2) *Inhalation* – most of the common fevers and respiratory infections;
- (3) The skin – where there are a number of opportunities for an agent to gain access. It may remain within the skin tissue (scabies), penetrate intact skin (leptospirosis), enter broken skin or wounds (tetanus), enter by bites of insects and animals (malaria and rabies), or by injection (hepatitis B).
- (4) *The placenta* – for the unborn child (rubella and syphilis).

### **Suitable recipient**

Whether a person develops an infectious disease after contact with any given causal agent is governed by a number of factors, e.g. the virulence and dose of the organism, the age of the individual (babies up to 6 months have natural immunity to some infections from their mothers), the nutritional state of the person, the presence of other diseases, and whether the individual is receiving immunosuppressive therapy.



**DEFINITIONS**

It is important to understand the common terminology associated with communicable diseases and parasitology.

*Communicable diseases.* These are synonymous with 'infectious diseases' and sometimes referred to as 'contagious diseases'. They are caused by a living organism and transmitted from person to person or from animal or bird to Man, either directly or indirectly.

*Epidemic.* An epidemic is an increase in the frequency of occurrence of a disease in a population above its base-line level for a limited period of time.

*Endemic.* An endemic disease is one which is constantly present in a population, though it may temporarily increase its incidence to become an epidemic.

*Pandemic.* An epidemic of world-wide proportions.

*Sporadic.* A term used when cases of communicable diseases occur in a number of different localities.

*Explosive outbreak.* A large number of cases arising in a population in a very short space of time. An outbreak of food poisoning following a communal meal where a large number of people are involved might be described in this way.

*Exotic disease.* An infectious condition which is not usually found in Britain, but may be imported from overseas.

*Incubation period.* The time which elapses between the person becoming infected and the appearance of the first symptoms. Its length is mainly determined by the nature of the infecting organism but is also influenced to some extent by the dose of the organism, the route of entry into the body, and the susceptibility of the host.

*Primary case.* The first case which occurs in an outbreak, also referred to as the 'index' case.

*Subclinical or inapparent infection.* An infection by an agent which gives rise to no reported symptoms or signs in the host.

*Carriers.* People who intermittently or continuously harbour infective organisms without suffering the clinical manifestations of the disease.

People who excrete the organisms only occasionally are referred to as intermittent carriers. Convalescent carriers are those who remain infective even after recovering from the illness and the term 'chronic' carrier is applied if this condition persists over months or years. Typhoid carriers may excrete the organism for years, usually because *Salmonella typhi* has infected the gallbladder. Some infections are carried by people who give no history of illness caused by the agent; this 'healthy' carrier state occurs in diphtheria.

**Exotoxins.** Toxins (poisons) produced by bacteria which pass into the tissues of the body. Examples of organisms which produce toxins resulting in illness are diphtheria and tetanus.

**Endotoxins.** Types of toxins liberated only when the bacterial cell wall is broken and which are less important in producing specific clinical manifestations.

**Disinfection.** The killing of an infectious agent by direct application of a chemical substance or by physical means such as heat. Concurrent disinfection is the application of disinfective measures to discharges, or excreta from the patient as they occur. Terminal disinfection is the use of disinfective measures after the recovery or removal of the patient. It usually applies to rooms and furniture, but is seldom necessary because thorough cleansing and good ventilation are equally effective.

**Disinfestation.** The removal or destruction of insects, their ova or larvae associated with an individual, his clothing or premises. It also applies to the destruction or removal of rodents.

**Reservoir of infection.** Any animal, insect, plant or inanimate substance (e.g. foodstuff) in which an infectious agent dwells and from which it is capable of being transmitted to a susceptible host.

**Droplet infection.** Infection caused by a projection of small droplets from the nose or mouth due to sneezing, coughing, talking or exhaling. The range of spread is usually limited to a few feet.

**Airborne infection.** This is due to the formation of droplet nuclei by evaporation; the particles are much smaller and more widely dispersed.

**Nosocomial infection.** An infection, occurring in patients or staff, which originated within the hospital or other institution.

**Medical parasitology.** Although many viruses, bacteria and fungi which cause disease in a strictly biological sense are parasites, it is customary to restrict the term medical parasitology to that branch of medicine which deals with those parasites living in or on Man which are members of the animal kingdom. They fall into three main groups: protozoa (single cell organisms); helminths (worms); and arthropods (insects).

**Zoonoses.** Communicable diseases which are transmitted to Man from animals.

**Hosts.** Animals (including Man) which give support to and provide a living environment for an infectious agent. Some parasites pass through their stages of development in different hosts.

**Definitive or primary host.** One in which the parasite reaches maturity or passes through its sexual stage.

**Intermediate or secondary host.** One in which the parasite is in its larval or asexual stage.

**Obligatory parasites.** Parasites which cannot survive outside the host.

**Facultative parasites.** Parasites which are capable of an independent existence outside the host.

**Pathogenic parasites.** Parasites which cause disease.

**Commensals.** Parasites which cause no harm to the host and one or both may gain benefit. If both gain benefit the state is symbiosis.

**Ectoparasites.** These parasites live only on the surface of the host's body and are usually insects.

**Endoparasites.** These parasites live only inside the host's body; examples are worms and many protozoa.

**Insect vector.** An insect which carries the disease agent either mechanically (on its feet or other parts of the body) or within its body so that the agent is transmitted to the person being infected either by saliva (when the insect bites) or by faeces (deposited on the skin).

## ORGANIZATION OF SERVICES

The services available to prevent, control and treat communicable diseases are briefly outlined in this section. Both local government and the NHS are involved; well-established working arrangements between the relevant authorities are essential.

### Local government district authorities

Local Government District Councils are responsible by statute law for the control of notifiable diseases and food poisoning within their boundaries. They appoint community physicians employed by health authorities to be responsible for communicable disease control. The title Medical Officers for Environmental Health (MOsEH) has been generally adopted for them. These are important posts. The officers who occupy them have direct responsibility for functions laid down by statutes so that Councils are required to appoint such officers as they think necessary for the *proper* discharge of their functions, hence the title 'Proper Officer' is sometimes used. Health authorities also have a broad responsibility for the prevention of diseases, including notifiable diseases.

When an outbreak of notifiable disease or food poisoning occurs the community physician (MOEH) who is designated as proper officer assumes responsibility for the introduction of control measures and, working in close co-operation with the local authority's Chief Environmental Health Officer, he obtains the necessary supporting staff. If the enquiries require the skill of a health visitor such help is obtained by the proper officer in consultation with the health authority's nursing officer.

### Public Health Laboratory Service

The Public Health Laboratory Service was originally established as an emergency service to deal with problems anticipated in World War II, but it proved to be so useful that it was made permanent. It is administered by the Secretary of State for Social Services through an appointed board. The headquarters and specialist laboratories are at Colindale, London, and there are about 50 other laboratories in different parts of England and Wales. Most are in hospitals and take part in the hospital diagnostic microbiology service.

The laboratories also work closely with the community environmental services to provide microbiological investigation of communicable disease outbreaks, food and drink products, water, and routine samples of other material. Local laboratories can refer, if necessary, to reference laboratories in particular cases.

In 1977, the Public Health Laboratory Service established a *Communicable Diseases Surveillance Centre* to make available advice

and assistance to community physicians and others involved in the investigation and control of communicable disease. In addition, the Centre maintains surveillance on the occurrence of communicable disease in England and Wales and publishes regular reports. Members of the staff of the Centre also play an important part in educational programmes concerned with the control of infectious diseases.

**Primary care services**

The general practitioner with the support of the primary care team (health visitor and home nurse) is the person who treats the majority of cases of communicable diseases in the home. Only serious cases or those with complications are admitted to hospital.

**Hospital service**

The fall in the incidence of infectious diseases over the years has led to fewer beds being required for their treatment. Many of the large infectious disease hospitals have partly or wholly changed use and others have been closed entirely. The remaining specialized hospitals for communicable diseases, therefore, have large catchment areas. Some have been designated as special hospitals, equipped and staffed to provide the skilled isolation procedures necessary for managing exotic diseases such as Lassa fever and Marburg disease. Many district general hospitals also maintain limited isolation facilities.

**Control of infection in hospitals**

Each major hospital or group of hospitals has a control of infection committee consisting of senior professional staff. The committee meets at regular intervals and keeps problems in relation to infection in the hospital under review. The day to day work is carried out by an infection control officer, usually a microbiologist on the hospital staff, and a full-time infection control sister. They carry out regular checks on the levels of infection (e.g. in operating theatres) and deal with outbreaks when they occur. Reports are made to the committee at regular intervals.

**Department of Health and Social Security**

The DHSS has overall responsibility for national policy matters in relation to communicable diseases, for example:

- (a) ensuring that adequate and suitable hospital accommodation is available for communicable disease cases;
- (b) supervision of immunization levels, not just at the time of outbreaks;
- (c) maintaining international communication networks on communicable diseases matters.

## **ACTION PLAN FOR THE CONTROL OF COMMUNICABLE DISEASES**

- Action should be governed by the characteristics of the disease; its frequency, severity, incubation period, and infectivity.
- Action taken should have a reasonable chance of success: balance effort against results.
- Action should precede final confirmation of diagnosis.
- Action to prevent the disease occurring should always be considered: primary prevention.

## **DEALING WITH THE MEDIA**

Television, radio and the press take an interest in any unusual outbreak of communicable disease, so that arrangements should be made at the outset to deal with the media. A single spokesman, acceptable to both the health and local authority, should be appointed and he or she should arrange to be available to the media at appointed times only. Possibly because of a fear of sensationalism on the part of the media many health professionals are apprehensive about having contact with them. If either authority has a Press Officer he might be the right person to act as spokesman, but personal experience suggests that representatives of the media prefer to discuss matters with a medically qualified person. Perhaps the MOEH as a doctor and as an officer of both authorities is the person of choice. In any case, it is essential that factual information is reported in an unbiased way. Reporters are quick to realize when information is being withheld, although they would not expect personal details about patients to be divulged. Experience shows that a balanced report is more likely to result where the fullest possible information is released to the media.

It is wrong to regard the media as a nuisance. Indeed, if good relations are established particularly with local press, radio and television, this contact can be a great asset, helping, for example, to trace contacts or giving health education advice, say about food hygiene.

## **LEGISLATION**

A considerable amount of legislation exists which relates to the control of the spread of infectious diseases and food poisoning. For half a century, this legislation has been added to and amended as knowledge has advanced and new hazards have been identified. Most of it is enforced by local authorities, whose two main officials are a community physician (seconded to local government acting as 'proper officer' for infectious disease legislation) and the chief environmental health officer (acting as 'proper officer' for other public health legis-

lation). In practice, persuasion and education are mainly used, and the courts are kept as a last resort. It is beyond the scope of this book to give details of legislative measures concerning communicable diseases and food poisoning, but three broad provisions are summarized below.

### Information about communicable diseases

It is essential that information concerning cases of communicable diseases should be quickly and readily available. A legal duty rests on all registered medical practitioners, whether working in general practice or in hospital, to notify the names and addresses of people recognized as, or suspected of, having certain specified infectious diseases.

The *notification* is made to the Medical Officer for Environmental Health (MOEH) acting as proper officer for the local government district where the case occurs; the statutory basis for this is the Public Health Acts (or in the case of food poisoning, Food and Drug Acts).

The following diseases are currently notifiable in England and Wales:

Anthrax	Paratyphoid fever
Cholera	Plague
Diphtheria	Acute poliomyelitis
Dysentery	Paralytic
Acute encephalitis	Non-paralytic
Infective	Rabies
Post-infectious	Relapsing fever
Food poisoning	Scarlet fever
Infective jaundice	Smallpox
Lassa fever	Tetanus
Leptospirosis	Tuberculosis (all forms)
Malaria	Typhoid fever
Marburg disease	Typhus fever
Measles	Viral haemorrhagic disease
Acute meningitis	Whooping cough
Ophthalmia neonatorum	Yellow fever

Unfortunately, there is a serious degree of undernotification of these diseases by medical practitioners, particularly so for the minor ones.

A statutory duty is also placed on certain managers, owners and occupiers of slaughterhouses, registered milk premises, ice-cream factories and food businesses to notify the local authority of the occurrence of disease in people with free access to ice-cream, milk and certain other foodstuffs for human consumption. These regulations also apply to carriers of disease and to contacts of cases. Usually employees will inform their employer when they contract an infection

and it is an offence for employees to continue to pursue these trades in the knowledge that they carry infection. Veterinary surgeons are required to notify certain diseases occurring in animals (such as rabies and anthrax) through the proper officer to the Local Government District Council. Similarly, captains of ships or aircraft must inform the Port Medical Officer of any episode of infectious disease (but not venereal disease) in the crew or passengers during a voyage. This is in addition to those diseases which must be notified under the international health regulations (plague, cholera, yellow fever and smallpox). Midwives must inform their employing health authority if they are in contact with, or suffering from, an infectious disease.

A weekly return is made by the MOEH to the Office of Population Censuses and Surveys (OPCS) of notifiable diseases which have been reported in his district. The MOEH also advises the Chief Medical Officer of the DHSS directly if a large outbreak of any infectious disease occurs or if a case of a serious disease such as plague, cholera, yellow fever, smallpox, leprosy, Lassa fever or Marburg disease is discovered. The proper officer also informs managers and others of cases of infectious diseases occurring amongst their work forces.

This exchange of information allows early action to be taken to control the disease, alert local doctors, ensure adequate availability of hospital beds and therapeutic facilities.

### **Medico-legal measures directed at the individual**

Compulsory medical examination of suspected cases, contacts or carriers of infectious diseases can be carried out on the authority of a Justice of the Peace (JP) after representation from the MOEH. Similar legal provisions exist for the compulsory removal to hospital of a person suffering from a notifiable disease, where proper precautions to prevent the spread cannot be taken or are not being taken. A JP is also empowered to order the detention of a patient in hospital if necessary. Restrictions are also placed on a person who knows he is suffering from a notifiable disease: he must not expose others to the risk of infection, attend a school, send infected articles to the laundry, return library books, enter any public convenience, or dispose of infectious matter in the dustbin. Most of these provisions are contained in the Public Health Act 1936 and it is doubtful whether all of them are still necessary, for example, it is unlikely that any infectious disease is spread by the use of library books. Powers exist to prevent known or suspected cases or carriers of infectious diseases from continuing to pursue certain occupations, particularly those that involve food. There is also provision for compensation by the local authority if a person is required to discontinue his employment for this reason.

In 1982, local authorities were given discretionary powers to require



registration of people (and premises) practising acupuncture, tattooing, ear-piercing and electrolysis. This measure is an attempt to ensure that adequate standards of hygiene are maintained and is of particular relevance to control of hepatitis B.

### **Legal measures for the prevention of food poisoning**

Legal safeguards exist to secure clean conditions for the importation, transport, storage, packaging and preparation of food, with the aim of preventing food poisoning. The law requires the provision of washing and sanitary facilities in food premises, the hygienic operation of slaughter houses, the control of shellfish, and the heat treatment of milk, ice-cream and liquid egg. Despite these measures, there remains a considerable problem arising from salmonellae in poultry, pigs and cattle, whose flesh provides meat for human consumption. There is little doubt that many of these organisms enter the food chain through imported animal foodstuffs and, although it is technically feasible to destroy them, the law making this compulsory needs to be strengthened.

## **COMMUNICABLE DISEASES**

The main features of some of the important infectious conditions which may be encountered in Britain are described in this section. Table 9.1 shows those which demonstrate certain patterns of incidence.

**Table 9.1 Pattern of incidence of communicable diseases**

<i>Unexpected</i>	<i>Extinct</i>
Botulism	Smallpox
<i>Increasing</i>	<i>Decreasing</i>
Food poisoning	Brucellosis
Hospital infections	Diphtheria
Malaria	Dysentery
Sexually transmitted diseases	Measles
Whooping cough	Poliomyelitis
	Scarlet fever
	Tetanus
<i>Recently recognized</i>	<i>Affecting the fetus</i>
Campylobacter infection	Cytomegalovirus infection
Chlamydia urethritis	Rubella
Infections in patients with impaired immunity	Syphilis
Non-A, non-B hepatitis	Toxoplasmosis
Rotavirus infection	Probably infections by other viruses
Viral haemorrhagic fevers	

## **Anthrax**

**Causal agent.** *Bacillus anthracis* is a large Gram-positive rod which occurs in short chains. The organism grows aerobically and forms heat-resistant spores capable of surviving for many years.

**Frequency and distribution.** Uncommon in Britain, between three and five cases occurred each year during the 1970s, with an occasional fatality. Patients are usually workers dealing with animal products such as hides, hairs, wool and bone. Sometimes gardeners using unsterilized bonemeal become infected.

**Identification.** The skin is the organ principally affected in this disease, and although respiratory and intestinal forms may occur they are uncommon and often fatal. In the cutaneous form, a skin lesion develops, usually about two to four days after local infection. It initially appears as a papule before becoming vesicular over a period of several days. After rupture of the vesicle, a deep-seated ulcer appears with swollen surrounding skin. It may then become covered by a scab. If left untreated spread to the blood-stream will lead to a septicaemia, which is fatal in as many as 20% of cases.

The diagnosis is usually confirmed by microscopy or isolation of the organism in culture of the skin lesion or blood.

**Incubation period.** Two to five days.

**Infectivity period.** Man-to-man infection has not been reported, but until the patient has received several days of treatment with antibiotics it is wise to avoid handling the lesion, which should be covered with an occlusive bandage.

**Reservoir.** Spores, often surviving for many years, are shed from the infected animal. Soil may also contain spores from the remains of dead animals.

**Mode of transmission.** Direct contact of the skin with either contaminated animal material or less commonly, with an animal dying of the disease leads to the cutaneous form. Even more rarely, inhalation of spores can produce the respiratory form of the disease and the ingestion of undercooked contaminated meat can result in the gastrointestinal form.

**Control measures.** Vaccination of workers, in conditions where they are exposed to the risk of infection, and the education of such workers in

personal cleanliness, treatment of minor injuries and the hazards of handling potentially infected material. Gardeners should take special care when using bonemeal known to be unsterilized. Protective clothing, dust reduction and medical supervision of those at risk at work are important. General environmental measures include the sterilization of hair, wool, hides and bonemeal, particularly of imported products. Rapid identification of outbreaks in animals is an important aim and the carcasses of animals dying from anthrax should be burnt or deeply buried in quicklime with any contaminated material, and equipment should be sterilized.

**Information.** A notifiable disease. The MOEH works closely with both the CEHO and Government Veterinary Service when a case is diagnosed.

## **Brucellosis**

**Causal agent.** *Brucella abortus*, a small aerobic, Gram-negative coccobacillus which does not produce spores, induces abortion in cows: the carcasses and the milk become infected. Other serological types are *Brucella melitensis* (which infects goats and sheep), *Brucella suis* (which infects pigs) and *Brucella canis* (which infects dogs), none of which are endemic in Britain.

**Frequency and distribution.** Worldwide distribution, but is more common in Mediterranean areas. In Britain the true incidence of the disease is not known, but by the late 1970s the number of laboratory identifications had declined to less than 100. The success of the brucellosis eradication programme in cattle is the main reason for the reduction in the numbers of human cases. The disease is more often found in rural areas amongst workers (including veterinary surgeons) who are involved with cattle or their untreated milk, and also people who drink unpasteurized milk. It is extremely rare in city dwellers.

**Identification.** The disease produces a pyrexia and accompanying symptoms (such as headache, general malaise) which may be of a short or long-term nature and either continuous or intermittent. The diagnosis should be considered in any pyrexia of unknown origin, especially in groups with a potential occupational exposure. The organism may be isolated in blood culture taken from the patient in the acute stages of the illness; but this is only likely to be so in about half the cases. The diagnosis is often made by serological tests which are of value slightly later in the illness.

**Incubation period.** Not less than 10 days, often it may be months, and up to 2 years is not unknown.

**Infectivity period.** No evidence of transfer from man to man.

**Reservoir.** There are a number of animal reservoirs of the infection, but in Britain the only animal of importance is the cow.

**Mode of transmission.** Direct contact with infected cattle, particularly the products of conception, and drinking unpasteurized milk from infected cows. The airborne route (inhalation of infected dust) in cattle sheds may occur.

**Control measures.** Isolation and surveillance of cases is unnecessary. As human immunization is not available, health education becomes important: farmers should be taught how to avoid infection and the public made aware of the dangers of drinking untreated milk. Outbreaks can usually be traced to an infected herd if those working with it or drinking its milk become infected. The general measure of raising herds of cattle which are free from *Brucella abortus* infection and the pasteurizing of milk would entirely eradicate the disease in humans if carried out meticulously. The eradication programme in Britain is well advanced, with many herds free from brucellosis.

**Information.** Not a notifiable disease but it is prescribed under the Industrial Injuries Scheme where the patient's employment is with bovine animals or in a laboratory handling *Brucella abortus*. The MOEH informs both the CEHO and the Government Veterinary Service when cases are discovered. Local authorities have powers to enforce the pasteurization of milk if the presence of *Brucella abortus* can be demonstrated.

## **Cholera**

**Causal agent.** *Vibrio cholera* is a slightly curved and twisted (comma-shaped), motile, aerobic, Gram-negative rod. There are two bio-types involved in pandemics: 'classical' and El Tor. Both produce illnesses which are indistinguishable, but they differ in laboratory haemolysis tests.

**Frequency and distribution.** During the last several hundred years classical cholera has been endemic in the basins of the rivers Ganges and Brahmaputra from which it has spread as a pandemic to many countries of the world. Fatality rates have been high, especially

amongst the poor. A pandemic of the El Tor variant started in Indonesia in the 1960s and reached Western Europe but as it was not the classical variety, it was much less severe in its effects. Britain has been virtually free of cholera during the present century, except for the occasional imported case.

*Identification.* The characteristic clinical features are very severe diarrhoea with copious watery stools ('rice water') accompanied by vomiting and rapid dehydration. The latter causes death in a high proportion of untreated cases. The organism may be identified in cultures from specimens of vomit, faeces or in rectal swabs. A rise in antibody titre in paired samples of sera is helpful in confirming the diagnosis.

*Incubation period.* Two to four days.

*Infectivity period.* The organism is excreted during the illness and for a few days after recovery. The carrier state is uncommon and usually lasts only a few months, in contrast to typhoid fever.

*Reservoir.* Man alone.

*Mode of transmission.* Mainly by contaminated water, also by food and flies. Direct spread from cases, carriers, or contaminated objects is very much less important. Gastric acid acts as a protector against infection; this partly explains the much higher rate amongst those who are poorly nourished, particularly those with a low protein intake.

*Control measures.* Acutely ill patients require hospital treatment with careful management to replace fluids and electrolytes, but strict isolation is unnecessary. Surveillance of contacts is important and their stools should be examined for *Vibrio cholerae* for five days following the last exposure. Vaccination gives low protection and short-lived immunity and is therefore of limited value. People travelling to areas where cholera is known to be present should take precautions with drinking water, salads and other uncooked foods. The main environmental control measures are the protection of water supplies and supervision of disposal of sewage. Health education of food handlers and measures to protect food against flies are also important. In a country with modern water supply and sewage disposal systems cholera is of almost no public health importance.

*Information.* A notifiable disease. If a case occurs in a district, GPs and hospital doctors should be informed.

## Diphtheria

**Causal agent.** *Corynebacterium diphtheriae* is a slender, Gram-positive rod, often with a club-shaped end. The organism does not form spores but does produce a powerful exotoxin.

**Frequency and distribution.** The disease has a worldwide distribution but is more common in temperate climates. During the last 30 years Britain has seen only sporadic cases or limited outbreaks, largely due to the success of the immunization policy. Between the years 1970 and 1979 there were 63 notifications of the disease and five deaths from it.

**Identification.** The disease is an acute upper respiratory tract infection which may affect the tonsils, pharynx, larynx, or nostrils and very occasionally the skin. The characteristic feature is the presence of a greyish membrane in the throat firmly attached and surrounded by inflammation, with enlarged cervical lymph glands. The main hazards (which may cause death, particularly in untreated cases) are local obstruction of the respiratory passages (by the membrane) and the effects of the exotoxin on the myocardium and on the peripheral nervous system (most seriously leading to paralysis of the respiratory muscles). Throat or nose swabs are taken from the suspected case, carrier or contact and the organism is identified after culture on a suitable medium. Once isolated the *Corynebacterium* should be tested for toxigenicity by injection into guinea pigs or by *in vitro* diffusion techniques. Serum antitoxin levels may further assist in diagnosis. Treatment and control measures, however, should be taken without waiting for laboratory confirmation.

**Incubation period.** Two to five days, occasionally a little longer.

**Infectivity period.** Cases usually cease to be infectious within a few days of effective treatment, but a persistent-carrier state can occur.

**Reservoir.** Man alone.

**Mode of transmission.** Direct contact with another human case or carrier, usually by the airborne route, but may be spread by discharges.

**Control measures.** The case is isolated and treated with antitoxin and suitable antibiotic therapy. Contacts are traced and kept under surveillance. The non-immune are immunized with the toxoid and some authorities believe that prophylactic antibiotics are also of value. Nose and throat swabs may identify carriers, who are then also isolated and

treated with antibiotics until the carrier state no longer exists. Articles that have been in close contact with the patient should be disinfected, especially those which may have been contaminated with nasal or oral secretions. Immunization is an important control measure so non-immunized children should be given a full course at once and others a booster dose. As immunization levels fall, there is always a risk that diphtheria may once again occur in epidemic form, particularly as a result of the infection being imported from parts of the world where it is still common. The key control measure is the maintenance of a high level of immunity in the child population by means of an effective immunization programme, not omitting to keep up immunity levels in residential institutions for children.

**Information.** A notifiable disease. When a case occurs the MOEH notifies local general practitioners, other community physicians and the laboratory services.

### **Dysentery, amoebic**

**Causal agent.** *Entamoeba histolytica*, a protozoon which can become a cyst with a tough resistant membrane. In the human intestine it can emerge from the cyst in its active (as opposed to its dormant) state and cause symptoms.

**Frequency and distribution.** Most common in the tropics and sub-tropics. Most of the 200–300 cases occurring in Britain each year are people who have contracted the disease in an endemic area overseas. A small proportion, possibly 2% of the population, are carriers.

**Identification.** There is a spectrum of severity with many people remaining asymptomatic whilst others proceed to ulceration of the bowel and hepatic involvement. The classical picture of amoebic dysentery is abdominal pain and recurrent attacks of diarrhoea containing blood or mucus. There are periods of remission and the cycle may continue for years. From this primary colonic site, in a small proportion of cases, the infection can spread to involve other organs (most often the liver). It is important to exclude amoebic dysentery when making the diagnosis of ulcerative colitis. The diagnosis is made by observing amoebae or cysts on microscopic examination of specimens of faeces. Tests on sera are available but are positive in only a proportion of cases and, most importantly, do not identify the carrier state.

**Incubation period.** Variable, most often two to four weeks, but can extend to months.

**Infectivity period.** Cysts may be passed in the faeces for many years.

**Reservoir.** Man is the sole reservoir, either as a symptomless carrier or with the chronic disease.

**Mode of transmission.** The infection is transmitted by the cysts by faecal-oral spread. The usual vehicle is contaminated water or food, especially salads and raw fruit.

**Control measures.** Provided proper precautions are taken in nursing the patient, no isolation is necessary, nor is there any need for surveillance of contacts except to ensure that fellow travellers have not contracted the disease. The maintenance of good standards of personal hygiene and the exclusion of cases and carriers from food handling are important in preventing this disease, as is the provision of a pure water supply and an adequate sewage disposal system.

**Information.** A notifiable disease.

### **Dysentery, bacillary**

**Causal agent.** *Shigella* is a group of Gram-negative rod-shaped bacilli of which there are four sub-groups: *Shigella sonnei*, which accounts for the great majority of cases of dysentery occurring in Britain; *Shigella flexneri*, only an occasional cause of infection in Britain but found most frequently in hospitals for the mentally ill or mentally handicapped; *Shigella boydii* and *Shigella dysenteriae* very seldom cause dysentery in Britain.

**Frequency and distribution.** The disease has a worldwide distribution. In Britain there are about 5000 notifications each year, with fewer than five deaths. Outbreaks of *sonnei* dysentery are often associated with day and residential nurseries, nursery schools and infant schools, as well as mental illness and mental handicap hospitals. Family outbreaks are also common.

**Identification.** There are many mild cases of this disease, whilst others have few or no symptoms. When the full clinical picture occurs it is typified by diarrhoea, of acute onset (with mucus, blood and pus in more severe cases), abdominal pain and fever.

The laboratory diagnosis of *Shigella* infection is made by isolation of



the organisms from the faeces: this applies to acute cases as well as chronic carriers. The demonstration of a rising antibody titre in the serum in sequential samples may also allow the diagnosis to be made.

*Incubation period.* Usually three to four days, but can vary between one and seven days.

*Infectivity period.* Patients are highly infectious during the acute stage of the illness and continue to excrete the organism for about four weeks after recovery. In a minority of cases, a chronic carrier state may develop.

*Reservoir.* The large intestine of Man.

*Mode of transmission.* By the faecal-oral route, either directly or indirectly. The direct method is probably quite common: young children carry the infection on their hands and pass it to other children or members of the family. Indirect transmission by fomites (such as door-handles and lavatory seats) is also probably common. It can also be spread by food and drink.

*Control measures.* In an established case, standard precautions should be instituted including care in the handling of excreta from the patient. Contacts should be traced and examined. Precautionary procedures include hand washing after using the toilet, the use of disposable paper towels, regular cleaning of lavatory door handles and seats and extra precautions in the preparation of food. The identification of asymptomatic carriers, particularly amongst food-handlers, is also important. In the event of an outbreak in a day nursery all new admissions should cease and all infected children should be excluded. New admissions should be screened before entry when the nursery is reopened to ensure that they are not infected. Three negative specimens are required before existing attenders may be readmitted. From personal experience, once an outbreak is established in an infant school or nursery it is difficult to control the spread of sonnei dysentery, even with the measures recommended. General environmental measures are less important in Britain, but include adequate disposal of sewage and the control of fly populations.

*Information.* A notifiable disease.

### **Enteric fevers**

*Causal agents.* *Salmonella typhi* (typhoid fever), *Salmonella paratyphi*

types A, B and C (paratyphoid fever). These bacilli are Gram-negative rods, identical in appearance, and distinguished only by different reactions in laboratory tests. An enteric fever-like illness can also be caused by other members of the *Salmonella* family, which usually cause gastro-enteritis.

*Frequency and distribution.* The diseases occur in all parts of the world, but are more common in the Middle and Far East from where many of the cases are imported into Britain. Certain categories of immigrants are particularly likely to have the infection. About 200 cases of typhoid fever are notified in Britain each year; over 80% are contracted abroad. Similarly most of the 60–70 notified cases of paratyphoid fever in Britain were contracted abroad.

*Identification.* The clinical picture of typhoid fever varies. Symptoms can include pyrexia, headache, anorexia, and constipation more often than diarrhoea. A classical rose spot rash may appear on the trunk and enlargement of the spleen may also occur. Rarely intestinal ulceration and perforation may occur. Paratyphoid fever has similar but milder symptomatology with a lower fatality rate. Clinical symptoms depend on the dose of the organism and a much larger dose is required to cause paratyphoid fever than typhoid fever. Sub-clinical cases of paratyphoid fever also occur. The laboratory diagnosis of the enteric fevers is made by isolating the organisms from blood culture (which is usually positive in the first week of illness) or from culture of faeces or urine (usually in the second and third weeks of the illness). Antibodies can be detected from the second week (Widal test) and a sharply rising titre in serial samples of sera confirms the diagnosis.

*Incubation period.* For typhoid fever this is usually 12 days, but can vary from one week to three weeks depending on the dose of organism. Paratyphoid infections have a shorter incubation period.

*Infectivity period.* For as long as the person excretes the organism, usually from the early stages of the illness until some weeks or even months after recovery.

*Reservoir.* Man. Usually the organism is found in the faeces but also can occur in the urine. Up to 5% of typhoid fever cases become permanent carriers, a permanent residue of infection is the gall bladder and in extremely persistent carrier states surgical intervention to remove it may be considered.

*Mode of transmission.* The mode of transmission of infection *par*

*excellence* is by food and drink which have been contaminated by contact with the case or carrier. Particularly implicated are those substances on which the organism can multiply: pastries, milk, milk products, ice cream, raw fruit and vegetables. Direct or indirect contact with a case or carrier is another possible means of spread, but is much less common. Impure water supplies have also been responsible for typhoid outbreaks.

**Control measures.** Cases should be isolated and barrier nursed, particular care being taken when handling the patient's urine and faeces. Contacts should be traced, kept under surveillance for three weeks and then if three consecutive faecal specimens are negative, the surveillance can cease. If the infection is traced to a food source, then a search should be made amongst the food handlers to identify the carrier. Special care must be taken to ensure that the 'recovered' case does not return to food handling until clear of infection, and many authorities recommend that patients who have had typhoid should never again handle food. The same approach should be taken with employees of water works as with food handlers. Health authorities should keep a register of the names and addresses of carriers. Mono-valent typhoid vaccine is of value in protecting travellers to areas where typhoid is endemic. It is not indicated during an epidemic in Britain because it confuses the process of diagnosis. Education of ex-patients about the risks of contaminating food is important. The general measures to prevent faecal-oral spread are outlined under the section on food poisoning. Other environmental control measures include adequate sewage disposal, the provision of a pure water supply and the control of flies and rodents. The public should be educated to high standards in food handling and particular care should be taken when dealing with milk and shellfish.

**Information.** A notifiable disease. General practitioners and appropriate hospital medical staff should be informed about the occurrence of a case.

### **Food poisoning**

The term food poisoning can broadly be defined as those conditions caused by the ingestion of food or drink in which the main presenting symptoms are diarrhoea or vomiting, singly or together.

**Causal agent.** The causal agents may be classified as follows:

- (1) Chemical,
  - (a) Inorganic chemicals, e.g. heavy metals;

- (b) Organic substances, e.g. mushroom toxins, shellfish toxins.
- (2) Bacterial.
- (3) Viruses.

Chemical agents are an infrequent cause of food poisoning and are not discussed here.

### *Bacterial food poisoning*

**Causal agents.** The main groups of bacteria which cause food poisoning are:

- (1) Those which are ingested in food in which they have grown (e.g. *Salmonella* and *Escherichia coli*)
- (2) Those which produce toxins in the intestine (e.g. *Clostridium perfringens* – previously called *Clostridium welchii*)
- (3) Those which release toxins into food in which they have grown (e.g. *Bacillus cereus*, *Clostridium botulinum*, and *Staphylococcus aureus*).

**Frequency and distribution.** This group of diseases occurs throughout the world. The commonest cause of food poisoning in Britain is *Salmonella* infection. The toxins of *Staphylococcus aureus* and *Clostridium perfringens* are also important, while *E. coli* is a more common cause in babies. *Vibrio parahaemolyticus* and *Clostridium botulinum* are uncommon causes of food poisoning in Britain.

The incidence of food poisoning has increased since World War II. During the 1960s there were 5–7000 notifications per annum, but by the end of the 1970s this had increased to 10–12000 per annum, in spite of improved knowledge of preventive measures. There were about 1000 prosecutions under the food hygiene legislation in 1970 and over 4000 in 1978. Changes in eating habits with a greater number of people eating in restaurants and canteens, an increased tendency towards made-up meat dishes and a general and regrettable laxity in standards of hygiene are the probable explanations for the increase.

**Identification.** In all cases the organism is identified by culture of specimens of infected material. The remains of food which is suspected as being the source of infection should be covered, before being transported to the laboratory, to prevent contamination which may confuse the diagnostic picture. In the case of *Salmonella* species, it is important to determine the precise serotype of the organism to allow its source and mode of transmission to be traced.

The main clinical features of the principal infections are as follows:

*Salmonella* infections – fever, headache, abdominal pain, diarrhoea and vomiting. The illness lasts from one to seven days and can be fatal, particularly in babies and the elderly.

Staphylococcal toxin – acute vomiting, abdominal pain, diarrhoea, sometimes collapse; there is no fever. The illness lasts about 24 hours and is seldom fatal.

*Clostridium perfringens* infection – abdominal pain and diarrhoea, vomiting is unusual. The illness lasts one or two days and is occasionally fatal in elderly people.

*E. coli* infection – pain and diarrhoea, sometimes pyrexia and vomiting. The illness lasts one to five days and may be fatal in infants.

*Vibrio parahaemolyticus* infection – diarrhoea, abdominal pain, vomiting and fever. The illness lasts two to five days.

Botulism – fatigue, headache and dizziness, and sometimes diarrhoea at first. Nervous system manifestations follow, with paralysis and disturbance of vision and speech. Death occurs within 8 days, but may sometimes be averted by antitoxin administration.

*B. cereus* infection – two types: one predominantly with nausea, vomiting and a little diarrhoea, the other with little vomiting but mainly diarrhoea and abdominal pain. The illness usually lasts 24 hours.

*Incubation periods.* *Salmonella* – 6 to 30 hours; *Staphylococcus aureus* – 2 to 4 hours; *Clostridium perfringens* – 6 to 24 hours; *E. coli* – 12 to 48 hours; *Vibrio parahaemolyticus* – 12 to 24 hours; *Clostridium botulinum* – 6 hours to 7 days; *B. cereus* – 1 to 10 hours.

*Reservoirs.* *Salmonella* (hundreds of different serotypes) – Man, domestic and pet animals. *Staphylococcus aureus* – human skin, nose, throat, boils and infected wounds. Staphylococcal toxins withstand boiling. *Clostridium perfringens* – spores found in meat and may survive normal cooking temperatures. *E. coli* – many varieties comprise the normal flora of the intestine, human and animal. *Vibrio parahaemolyticus* – found in seafoods such as prawns, crabs and shellfish. *Clostridium botulinum* – soil, water, the intestines of animals, including some fish. This anaerobic organism produces spores which are very resistant to heat although its toxins are easily destroyed by it. *Bacillus cereus* – widely distributed in nature in soil and many foodstuffs, including cereals (it is anaerobic and produces heat-resistant spores).

**Mode of transmission.** In general, bacteria causing food poisoning need a nutritious medium and this is well provided by meat, meat products, poultry, milk, milk products, egg and egg products. Organisms also require a moist environment and survive better at a neutral pH. Salt inhibits growth in most cases, except for *Staphylococci*. Fat and high sugar content of food also inhibits bacterial growth. Organisms multiply on food particularly well at body temperature, but most can also grow at temperatures between 5 and 50 °C.

Specific features for different organisms are: *Salmonella* – due to eating food which has been contaminated by the faeces of infected humans and animals. Foodstuffs commonly incriminated are prepared meats, poultry, eggs and egg products. Many of the *Salmonella* variants have been introduced into the food chain by imported animal foodstuffs. *Staphylococcal* – commonly due to contamination by a food handler. The organism grows on food producing the toxin, hence prepared meat products, pastries, custards and salads are often incriminated. *Clostridium perfringens* – usually via inadequately cooked, slowly cooled or reheated meats and poultry, on which the spores are allowed to form. The spores change into the vegetative form and grow rapidly if the cooling process is slow or if the food is stored in a warm environment and inadequately heated before serving. Large doses of the organisms are required to produce symptoms. *Vibrio parahaemolyticus* – raw or inadequately cooked seafoods. *Clostridium botulinum* – most frequently associated with home bottling or canning of vegetables, fruit or fish, and sometimes smoked meat or fish. *Bacillus cereus* – outbreaks have been traced to rice which has been cooked, stored and reheated later.

### Control measures

- (1) Separation of raw meat (which should always be regarded as potentially contaminated) from cooked meat and avoidance of cross-infection by using separate cutting tools and other utensils.
- (2) Maintenance of high standards of personal hygiene by those handling food, e.g. washing hands before and after handling food and after going to the toilet.
- (3) Maintenance of high standards of hygiene of food preparation areas and kitchen equipment.
- (4) Avoidance of transference of infection from the nose and throat by the fingers to food by covering all cuts and sores.
- (5) Exclusion of patients with symptoms of food poisoning from food handling: also health staff with symptoms who deal with high-risk patients. In some circumstances it may be necessary to

exclude symptomless carriers of *Salmonella* organisms from food handling.

- (6) Attention to the temperature of storage. Foods should generally not be maintained at room temperature for any length of time. Cold foods (e.g. salads, cream cakes) should be kept refrigerated and hot foods (e.g. casseroles, meat dishes) should be kept hot, not warm. Frozen food, especially poultry, must be completely defrosted before cooking, and if possible eaten immediately. If it is stored, the temperature should be lowered quickly to and maintained at 4 °C to minimize bacterial growth.
- (7) Control of rodents, cats, dogs and other pets and flies.

In addition, other general control measures are important for specific conditions. In the prevention of botulism, for example, guidance should be issued about the need to maintain adequate temperatures, pressures and levels of acidification in the home bottling of vegetables. Such processes are already in operation in the commercial context.

**Information.** A notifiable disease. Depending on the circumstances the MOEH may need to inform the Government Veterinary Service, GPs and Hospital Medical Officers, as well as those involved in food handling.

### *Campylobacter infection*

Recently recognized as a cause of food poisoning. The importance of *Campylobacter* as a cause of gastro-enteritis has recently been appreciated with the development of improved laboratory techniques for its diagnosis. Specific antibodies can be demonstrated in the serum early in the illness. The symptoms are diarrhoea and abdominal pain, sometimes with pyrexia. Vomiting is unusual. The incubation period is two to five days. The organism multiplies in the small intestine and the source of infection is probably the gastro-intestinal tract of animals: poultry, cattle and pets (1% of the canine population are carriers). Outbreaks have been traced to milk, water and under-cooked chicken. Cases have been reported from handling sick pets. Person-to-person spread is unusual.

### *Viruses and gastro-enteritis*

The role of viruses in food poisoning has received greater attention in recent years with advances in laboratory techniques. However, the aetiology and natural history of such diseases is still incompletely understood. Virus particles can often be seen in the stools of patients with diarrhoea when no other pathogenic organism can be isolated, but

the same viruses are not discovered in foodstuffs which have been thought likely to cause the illness. Viruses cannot grow in most foodstuffs: they require living cells such as shellfish. Investigations have therefore proved difficult.

Parvovirus and rotavirus are known causes of gastro-enteritis, as are adenovirus, astrovirus, calicivirus and Norwalk agent. A spectrum of gastro-intestinal symptoms in which viruses have been implicated has been recognized for many years and referred to variously as 'epidemic' or 'winter' vomiting. The main symptoms are nausea and vomiting, sometimes severe and lasting for up to 24 hours. Abdominal pain, diarrhoea and pyrexia may also occur. Children and young adults are most commonly affected and, whether small outbreaks or large epidemics occur, the illness is usually mild and recovery rapid. The mode of spread is unknown but the faecal-oral route is probably important. Parvoviruses have been isolated from the faeces of patients who contracted vomiting and diarrhoea after eating cooked cockles in England. Rotavirus (its name derives from the fact that it resembles microscopically a cartwheel) produces an illness with symptoms similar to the parvovirus, but it affects almost exclusively children under 5 years old, although more recently outbreaks have occurred in geriatric wards. The illness is usually mild, but occasional deaths have been reported. Cases are sporadic or occur in small outbreaks, so many go unreported. A similar virus causes diarrhoea in young calves. The reservoir of both viruses is probably Man and both incubation periods are short, usually less than 48 hours. With the paucity of knowledge about the precise spread, control measures are difficult to implement, but it is wise to initiate the standard measures for the prevention of faecal-oral spread.

### **Haemorrhagic fevers (Lassa, Marburg and Ebola fevers)**

Some haemorrhagic fevers caused by viruses such as smallpox and yellow fever have been known from early times. However, in the last two decades new haemorrhagic illnesses have been recognized in Man, although it is likely that they have been acquired by Man from natural animal hosts, where they have probably always existed. The main public health concern is that the viruses, having been transmitted from their natural host to Man, are then capable of producing man-to-man transmission. In theory, therefore, it is possible for these diseases to be imported into Britain, where despite the absence of natural hosts for the virus they could be transmitted within the population.

*Causal agents.* Lassa fever – caused by a member of the Arena virus family, first isolated from an American missionary nurse in the Lassa township in Nigeria during 1969; since then it has also occurred again



in Nigeria, Sierra Leone and Liberia and elsewhere in West Africa.

Marburg disease – caused by a virus first described in Marburg in the Federal Republic of Germany in 1967 when 31 cases with seven deaths occurred in Germany and Yugoslavia due to direct contact with the blood, organs or tissues of a batch of African Green Monkeys trapped in Uganda.

Ebola fever – a very large outbreak of viral haemorrhagic fever with high fatality rates occurred in the Southern Sudan and Zaire in 1976. The causal virus was found to be morphologically identical to the Marburg virus, but serologically distinct, and the new strain was named the Ebola virus.

*Frequency and distribution.* Five cases of Lassa fever were imported into the United Kingdom in the years between 1969 and 1976. One case of Ebola fever has occurred in a laboratory worker in Britain in November 1976.

*Identification.* Lassa fever – the disease should be suspected in patients with unexplained pyrexia returning from West Africa within the previous 14 days, provided malaria has been excluded as a diagnosis. The disease has an insidious onset with a variety of non-specific symptoms including general malaise, pyrexia, sore throat and enlarged lymph glands. Later the patient's condition worsens with conjunctivitis, chest and abdominal pains, vomiting, and occasionally a mild maculopapular rash. A characteristic finding is pharyngitis with the presence of exudate. In fatal cases death occurs around the 14th day of illness.

Marburg and Ebola fevers – the illnesses produced by Marburg and Ebola viruses are virtually identical. The onset is abrupt with severe headache, high fever, generalized pain, severe diarrhoea, vomiting, cough, and often a maculopapular rash. Severe bleeding occurs between the fifth and seventh days, most often into the gastro-intestinal tract and lung. In fatal cases death occurs between the 7th and 16th day. Investigations to identify these viruses should be carried out only under safe and secure circumstances.

*Incubation period.* Lassa fever – three to sixteen days. Marburg disease – three to nine days. Ebola disease – four to sixteen days. The surveillance period for these fevers is usually extended to 21 days as an added precaution.

*Infectivity period.* All these diseases are infectious in the acute febrile stage and also the convalescent phase.

**Reservoir.** Lassa fever – a species of wild rodent (*Mastomys natalensis*) in rural West Africa. Ebola and Marburg disease – animal reservoir unknown.

**Mode of transmission.** Lassa fever – Man acquires the infection probably through contact with rodents' urine. Person-to-person spread may occur via the upper respiratory tract, but more often is due to contact with infected blood, urine or secretions of the patient. Marburg and Ebola diseases – although the original outbreak of Marburg disease occurred as a result of contact with African Green Monkeys, further transmission of the disease from an animal to Man has not been demonstrated. Person-to-person spread has usually been due to very close contact with infected individuals. Many outbreaks have been related to hospitals in Africa where unsatisfactory practices have spread the disease amongst patients and staff. In some of these outbreaks the mortality rate has been over 50%. Such hospitals acted as 'amplifiers' of the infection, with secondary cases occurring amongst staff and other patients. However, the introduction of adequate precautionary measures (care in handling patients' blood, urine and other secretions) quickly brought the disease under control in one outbreak of Ebola fever. In the original outbreak of Marburg fever a number of secondary cases occurred amongst hospital staff who had had contact with patients' blood. Of great public health concern, however, is the fact that one case was apparently transmitted by sexual intercourse and the virus was subsequently isolated from the semen 83 days after the initial illness. None of the six secondary cases died and since the original outbreak three other cases have been recorded in Africa in 1976, one of whom died.

**Control measures.** These special measures are the same for suspected cases of Lassa, Marburg or Ebola fevers. When a suspected case occurs (usually a traveller from abroad who has been in contact with the disease), the MOEH, together with a member from the panel of experts appointed by the DHSS, assesses the situation and judges whether the patient should be admitted to hospital. If so, the transfer is effected by special ambulance whose crew wear protective clothing and special respirators. The patient enters a high security isolation unit, sited usually in large infectious diseases hospitals. Such units are equipped with plastic isolators kept under negative air pressure. Close contacts of the patient, either those in the same household or workmates, are kept under daily surveillance for 21 days from the date of exposure. A daily record is kept of temperature and if a rise occurs or other signs or symptoms are evident immediate isolation should be effected. It is probably unnecessary to keep the patient's family in strict household

isolation, although this was carried out in the only case of Ebola fever in Britain which occurred in a laboratory worker.

*Information.* All are notifiable diseases.

## **Hepatitis**

### *Hepatitis A (infectious hepatitis)*

*Causal agent,* Hepatitis virus type A.

*Frequency and distribution.* It occurs in all parts of the world but more often in temperate zones where both sporadic cases and epidemics occur. It is more common in children and young adults. In Britain, epidemics tend to extend over long periods of time, more commonly in the autumn than the winter. Outbreaks are sometimes associated with schools and closed communities for children. There are approximately 5000 notified cases of infective jaundice per annum, but these include those due to hepatitis B virus. There are far more subclinical cases than clinical ones.

*Identification.* Many infections with the type A virus have no marked symptoms, other cases have anorexia, abdominal discomfort and pyrexia but no jaundice. Others develop jaundice, which may result in a mild illness lasting about a week or a more severe illness lasting several months. Recovery is slow in the latter instances, but most cases make a complete recovery. The diagnosis is usually made from the history and clinical features, but liver function tests are usually abnormal. Serological diagnosis is by detection of hepatitis A specific immunoglobulin M (IgM). At the same time hepatitis B antigen is sought.

*Incubation period.* Two to six weeks.

*Infectivity period.* The case is infectious during the latter half of the incubation period and the early stages of the illness, but there is no known carrier state.

*Reservoir.* Man and some other primates.

*Mode of transmission.* Person-to-person mainly by faecal-oral route, but possibly also by droplet spread. Contaminated water and food act as vehicles and shellfish have been incriminated in a number of outbreaks.

**Control measures.** Strict isolation of the patient is unnecessary because the stools are virus-free shortly after the jaundice appears. However, it is usual to adopt the standard precautions in handling urine, faeces and blood from the patient. Surveillance of close contacts, new cases and undiagnosed cases should be carried out. It is often difficult to trace the source of the outbreak: the long incubation period and the frequency of mild or asymptomatic illness are the reasons for this. There is little to be gained from excluding contacts from school, but it is wise to remove young people (who are the most susceptible) from food handling for 6 weeks. A high standard of personal hygiene is especially important when infectious hepatitis is prevalent. Human immunoglobulin gives protection for about 3 months and in special circumstances may be indicated. The general environmental measures of providing uncontaminated water supply and adequate sewage disposal are important in preventing the spread of infection.

### *Hepatitis B (serum hepatitis)*

**Causal agent.** Hepatitis virus type B.

**Frequency and distribution.** Occurs throughout the world. The incidence in Britain is not accurately known, but it is included in the notification of infectious jaundice (approximately 5000 cases per annum). There were over 2000 hepatitis B antigen (HBsAg) infections detected by the Public Health Laboratory Service in 1978. The carrier state is of particular importance in this disease. In Britain only 0.2–0.5% of the population are carriers, but in southern Europe the carrier rate is up to 5% and in the tropics 10%. In parts of the Far East, some 15–20% of people may have serum which is positive for HBsAg (see below). Most of the carriers in Britain have no previous history of jaundice.

**Identification.** Patients typically present with gradual onset of 'flu-like' symptoms such as malaise, anorexia, nausea, vomiting, abdominal discomfort and aching muscles and joints. A rash may occur in this early phase of the illness, but fever is not usually a prominent feature. Clinical jaundice may then ensue or the patient may remain anicteric, the diagnosis being made by liver function and other tests. The fatality rate and likelihood of permanent liver damage in hepatitis B is higher than with hepatitis A infection, where almost all patients make a rapid and full recovery. This is probably due not only to the differing virulence of the two organisms but also that the groups of people who develop hepatitis B are generally in a poor physical condition and often have other illnesses. Three antigenic components

of hepatitis B virus have been identified, each with associated antibodies: (a) the surface or capsule antigen (HBsAg), also referred to as the Australian antigen, with the associated antibody (Anti HBs) can be detected by various techniques including radioimmunoassay and electron microscopy; (b) the core antigen HBcAg which is not normally detected because it is neutralized by excess antibody (Anti HBc) which is detectable; and (c) most recently a third antigen (HBeAg) and antibody (Anti HBe) have been discovered. All are markers of infection and their presence in the serum of a proportion of the population who have apparently had no clinical infection presents a particular public health problem in the context of blood transfusion and medical instrumentation by medical and non-medical personnel.

*Incubation period.* Fourteen to 200 days, usually over 40 days.

*Infectivity period.* The individual is most infective during the late convalescent period, but also during the clinical phase of the illness. In many cases, the serum then becomes free of hepatitis B antigen. In others, it can remain infectious for many months, whilst in about 5–10% of cases the antigen remains in the serum for a considerable number of years. People who have had hepatitis should not be blood donors, nor should those who give no history of hepatitis but whose serum shows the presence of HBsAg.

*Reservoir.* Man and possibly other primates.

*Mode of transmission.* From another human case or more often a carrier, usually by inoculation of blood but possibly also of saliva or semen. Transmission may occur through drug abuse, tattooing, acupuncture, ear-piercing and male homosexuals, medical and dental instrumentation, and it is an occupational risk in those involved in handling blood products and dialysis. It has also been suggested that it can be transmitted by insect bites. Blood transfusion is an unlikely method in Britain as strict screening of donor blood is now carried out, but in countries where payment is made to blood donors, the risk of transmission through this means is much greater.

*Control measures.* Isolation of cases is unnecessary, but strict precautions are required in the handling and disposal of blood. Surveillance of contacts is indicated if the source is identified (e.g. a tattooist). General preventive measures include adequate precautions as part of the normal routine in all places handling human blood and its products and this includes the correct disposal of used syringes in all settings in which they are used. Specimens must be labelled 'High Risk' and sent

in special containers. Special risks apply to patients and staff of renal units, where vigilance should be especially high. The screening of potential blood donors for the carrier state has already been mentioned. Health education is important amongst special and high-risk groups such as drug takers and male homosexuals. Adequate sterilization of instruments should be undertaken and wherever possible disposable needles and instruments should be employed and used once only for each patient. There is a clear need also in this way for a closer supervision of tattooing, ear-piercing and acupuncture. Patients should be screened before admission to renal dialysis units. Those who are positive (HBsAg +) should be nursed at home. Sometimes screening procedures are also carried out on drug addicts and male homosexuals. Patients who are HBsAg positive should be educated about the mode of spread of the disease and told to modify their habits accordingly.

*Information.* Hepatitis B is notifiable as infectious jaundice.

#### *Non-A, non-B hepatitis*

Following the establishment of accurate diagnosis, by serological means, of hepatitis A and hepatitis B infections, it has recently been realized that one or possibly two additional types of viral hepatitis exist. This recognition principally came about because of the persistence of a small number of cases of post-transfusion hepatitis, even in circumstances where strict screening of blood donors for hepatitis B had taken place. Blood from patients who are carriers of non-A, non-B infection causes jaundice in certain animals, but firm evidence of the existence of a virus particle or a specific antigen/antibody system associated with these infections has not been established. The infection can be spread by injection of serum but does not appear to spread in families or with male homosexual activity (as hepatitis B). Therefore there is special significance for the blood transfusion service and particularly with pooled serum. The incubation period is 2–26 weeks. The initial symptoms are usually mild, many patients having no jaundice, but as many as 30% may develop chronic liver damage.

At present, the diagnosis is usually made by exclusion and much more work is still required to fully elucidate the aetiology, mode of transmission and natural history of this condition.

#### **Influenza**

*Causal agent.* Influenza viruses, of which three types have been identified. Epidemics are caused by types A and B. Type C is less common and associated with sporadic cases.

**Frequency and distribution.** It is worldwide in occurrence. The very high fatality rate of the pandemic of 1918–1919 (as many as 20 million people are estimated to have died) is thought to have been due to poor nutrition following World War I, but it may have resulted from a virus of enhanced virulence. Later pandemics caused by different strains of the type A influenza virus – the ‘Asian’ influenza pandemic of 1957–1958 and the ‘Hong Kong’ influenza pandemic of 1968–1969 – produced milder illnesses, but large numbers of fatalities occurred particularly in susceptible groups such as the elderly. Although sporadic cases are reported, large or small epidemics are the usual mode of occurrence. They occur with regular periodicity of about 3–4 years and peak occurrence is in the winter months. The incidence is much higher amongst schoolchildren and the mortality is mainly confined to the old.

**Identification.** The clinical picture is of sudden onset of headache, fever, muscle pains and respiratory symptoms, which may be followed by secondary bacterial infection. Respiratory infections are often labelled as ‘flu’ when they are not truly caused by the influenza virus. Indeed, the kind of upper respiratory symptoms which occur with the common cold are not a feature of influenza. In the early stages of the illness, the virus may be grown in culture from throat or nasal swabs. An increasing level of antibody in paired sera at 10–14 day intervals may assist in making the diagnosis.

**Incubation period.** Two to three days.

**Infectivity period.** It is a highly infectious disease, particularly during the early period of the illness.

**Reservoir.** Man, although identical type A viruses have been isolated from horses, birds and swine; hence it has been suggested that changes in the genetic structure may arise from animal reservoirs or are mixtures of human and animal strains. Types B and C have been isolated only from Man.

**Mode of transmission.** Droplet and airborne spread and indirectly by objects contaminated with fresh secretions from the nasopharynx.

**Control measures.** There is little value in isolating cases because of the large number of cases which occur in epidemics. Active immunization with the influenza vaccine is reserved for people at special risk, such as the elderly and those with cardiac-respiratory problems.

**Information.** Not a notifiable disease. However, when an epidemic is imminent the MOEH can monitor its progress by reviewing school absentee rates and changes in the number of sickness absence returns made to the Social Security Office, as well as through his informal contacts with general practitioners. Influenza is one of the diseases kept under surveillance by the World Health Organization.

### **Legionnaire's disease**

**Causal agent.** The illness derived its name from 183 cases of pneumonia which occurred amongst 4000 delegates attending an American Legion convention in Philadelphia in July 1976. The episode attracted wide publicity, particularly in view of the 15% fatality rate, and it was intensely investigated. Many agents were suggested as being responsible for the outbreak, some of them fanciful, but it was eventually established that the disease was caused by a small Gram-negative coccobacillus (named *Legionella pneumophila*), previously unrecognized, which was isolated from the water in the air-conditioning system in the hotel. It is a soil organism and outbreaks are often associated with soil disturbance. This is particularly likely to occur in new constructions.

**Frequency and distribution.** Since its original description, the disease has produced small outbreaks in hotels and other large buildings (including hospitals) in Britain and other parts of the world, as well as frequent sporadic infections.

**Identification.** Adults, usually men in late middle-age (who may be heavy drinkers and smokers) are most frequently affected. Fatality rates have been in the region of 15%.

**Incubation period.** Not known.

**Infectivity period.** Not known.

**Reservoir.** The bacterium is widely distributed in nature and often found in soil and water. Although not usually found in mains water supplies it may become established in water systems in large buildings; the likelihood of this is increased by stagnation and temperatures between 20 and 45 °C.

**Mode of transmission.** The presence of *Legionella pneumophila* does not usually lead to an outbreak of Legionnaires' disease. Nevertheless, the main route of infection when it does occur seems to be via inhal-



ation of contaminated aerosols from cooling towers or from shower heads. Person to person infection has not yet been reported.

**Control measures.** Knowledge about Legionnaires' disease is accumulating, so that approaches to its prevention or the occurrence of an outbreak are still imprecise. Control methods usually entail adjustments of the temperature of a water system or the addition of chemical agents to it. General preventive measures include regular inspection, cleaning and disinfection of cooling towers, evaporative condensers and humidifiers. Cold water should be stored and distributed at temperatures below 20 °C and where this is not practicable it should it should be kept as near to 20 °C as possible.

**Information.** Not a notifiable disease. In the event of an outbreak the MOEH will inform and liaise with the Public Health Laboratory Service, the appropriate engineers and the local water authority if it is intended to treat the water chemically. In a hospital outbreak, the Control of Infection Officer must also be involved.

## **Leptospirosis**

**Causal agent.** *Leptospira*, a spirochaete with many different serotypes. Three main serotypes cause disease in humans – *Leptospira icterohaemorrhagiae*, *Leptospira canicola* and *Leptospira hebdomadis*.

**Frequency and distribution.** The disease occurs in all parts of the world. In Britain it was traditionally associated with sewage workers and now is usually seen in farm workers or, less commonly, amongst butchers, pest-control workers and veterinary workers. Swimming in water contaminated by animal urine can also cause the disease and *Leptospira canicola* can be contracted from dogs kept as domestic pets. Public Health Laboratory Service reports over recent years indicate that there are about 60 cases of leptospiral infection in humans in England and Wales each year. About half of these are icterohaemorrhagica and in recent years hebdomadis has become more common than canicola. In 1981 there were 73 cases (seven fatal) who were mainly male manual workers, but two were 14 year old boys who had fallen into polluted water.

**Identification.** The clinical manifestations are sudden in onset with pyrexia, headache, muscular pain and sometimes vomiting. Occasionally a petechial rash occurs. More severe cases develop jaundice. Canicola may present as meningitis rather than jaundice. Spirochaetes can be cultured from patients' blood and sometimes the urine. Anti-

bodies can usually be demonstrated in the serum from the end of the first week of illness.

*Incubation period.* About ten days.

*Infectivity period.* Man-to-man transmission is unimportant.

*Reservoir.* Many animals, including rats and other rodents, dogs, cattle, foxes and squirrels carry the different serotypes. In Britain the main concern is rats (*Leptospira icterohaemorrhagiae*), dogs and pigs (*Leptospira canicola*) and cattle (largely *Leptospira hebdomadis*). Cattle become infected through grazing on fields contaminated by the urine of small rodents. In some surveys over 60% of cattle sera show antibodies to *Leptospira* strains, particularly *L. hebdomadis*.

*Mode of transmission.* Direct contact with water, damp soil or vegetation which has been contaminated by the urine of infected animals or less commonly directly from the infected animals. The spirochaete enters broken skin, via mucous membrane, or may be swallowed.

*Control measures.* There is no need to isolate the case but fellow workers should be kept under surveillance for signs of infection. Protective clothing should be worn by workers in hazardous occupations and wounds and cuts covered. Education is important, both of workers in high-risk occupations and of the public about the dangers of swimming in contaminated waters such as may be found in disused canals. General environmental control measures include extermination of rodents, particularly near factories and other places of work.

*Information.* Although the disease is notifiable in its own right, its true frequency may be concealed by the fact that some notifications are as infectious jaundice. Workers who contract the disease can obtain compensation under the Industrial Injuries scheme as an occupational disease.

## **Malaria**

*Causal agent.* A protozoon, genus (family) name *Plasmodium*. Four species cause human malaria: two are uncommon (*Plasmodium malariae* and *Plasmodium ovale*), and two are common (*Plasmodium vivax* the cause of benign tertian malaria and *Plasmodium falciparum* which causes malignant tertian malaria, a non-relapsing and serious disease with a high fatality rate).

**Frequency and distribution.** This is a very common disease in many parts of the tropics and sub-tropics. The vivax form predominates in Asia, the falciparum in tropical Africa and Central America. Cases of malaria which occur in Britain have been contracted overseas. The numbers of cases have been increasing over the last decade: in England and Wales in 1970 there were 134 notifications and two deaths, while in 1979 there were 1625 notifications and six deaths. The number of notifications fell to 1296 in 1980, possibly as a result of less overseas travel or better prophylaxis; however, eight of these cases were fatal.

**Identification.** After an initial period of general malaise, pyrexia, shivering and profuse sweating occur in cycles according to the stage of development of the parasite in the human body. These symptoms can vary both in type and severity according to the species of malaria. The diagnosis of malaria should be considered in any patient with a pyrexial illness who has recently been in an epidemic area. It is confirmed when the parasite is demonstrated microscopically in blood films.

**Incubation period.** Ten to 30 days.

**Infectivity period.** Clearly the infection is not transmitted within Britain in the usual way by mosquitos. There is a rare possibility of transmission by blood transfusion.

**Reservoir.** Man.

**Mode of transmission.** Transmitted by the female anopheline mosquito, the definitive host of the parasite. The mosquito bites man and ingests human blood containing gametocytes (male and female). In the mosquito's stomach these male and female stages join together to form sporozoites. These concentrate in the salivary glands of the mosquito and are injected into man when the mosquito next feeds. They pass in the blood stream to the liver, where they develop into merozoites (pre-erythrocytic cycle). The clinical attack begins when these are released into the blood stream and invade the red cells, where they can undergo a complete cycle of development (erythrocytic cycle), resulting in further release of merozoites into the blood stream and a further clinical attack. Some also develop into gametocytes which can then be taken up by the mosquito. The life cycle in the mosquito spans 10–14 days, and the pre-erythrocytic cycle in the liver 7–9 days. The duration of the erythrocytic cycle varies with the species of parasite: 36–48 hours (*P. falciparum*); 48 hours (*P. vivax* and *P. ovale*); and 74 hours (*P. malariae*), which accounts for the different periodicity of clinical attacks in the different forms. A proportion of the merozoites

from the pre-erythrocytic cycles continue to develop in the liver (exo-erythrocytic cycle): this provides for the source of infection in relapses which may occur several months after a previous attack. Relapses are particularly common with *P. vivax* infections.

**Control measures.** Isolation of cases is unnecessary and surveillance of contacts in Britain is only performed to ensure that fellow travellers have not also contracted the disease. Environmental measures are not needed in Britain. Travellers going to, or passing through, endemic areas should take prophylactic anti-malarial drugs and continue taking them for 4–6 weeks after leaving the endemic area.

**Information.** A notifiable disease.

## Measles

**Causal agent.** Measles virus.

**Frequency and distribution.** It occurs in all parts of the world. In developed countries it is usually a mild disease with a low mortality rate, but in developing countries, with poorly nourished inhabitants, childhood mortality can be up to 25%. Even in developed countries, however, serious complications are not uncommon. Until the introduction of mass measles vaccination few people in Britain reached adult life without having had the disease. The use of the vaccine has also altered the previous classical two-yearly epidemic. The number of notifications for most years in the 1970s was within the range 50–150 000, compared with nearly half a million in 1967.

**Identification.** The virus produces a prodromal illness with upper respiratory symptoms, pyrexia, and spots (Koplik spots) on the buccal mucosa. Classically the maculopapular rash appears on the fourth day of the illness, but this is variable. The blotchy rash starts on the face and spreads over the body. Secondary bacterial infection of the respiratory tract and otitis media are common complications, encephalitis is rare. A very rare complication is sub-acute sclerosing panencephalitis, which results in death in a few months. The frequency of cases proceeding to complications has remained unchanged since the introduction of the vaccination programme. The diagnosis is usually made purely on clinical grounds, but a rising antibody titre is also indicative.

**Incubation period.** Seven to 14 days, usually ten days.

**Infectivity period.** This is a very infectious illness, particularly in the

prodromal phase, and the patient is infectious for four to five days after the appearance of the rash.

*Reservoir.* Man only.

*Mode of transmission.* Droplet spread and indirectly by objects freshly contaminated by secretions from the nasopharynx.

*Control measures.* Isolation of the case is advocated, but is probably of little practical value in such a highly infectious disease and especially as the child is usually ambulant in the early prodromal period when the disease is most infectious. Immunization offers the only real protection.

*Information.* A notifiable disease.

### **Meningococcal meningitis**

*Causal agent.* *Neisseria meningitidis* (Meningococcus) is a Gram-negative diplococcus (i.e. usually occurring in pairs).

*Frequency and distribution.* Worldwide distribution. In Britain, sporadic cases and localized outbreaks occur, particularly in children and young adults. Infection has been associated with over-crowding and physical fatigue.

*Identification.* The organism commonly causes a sub-clinical illness. In cases where meningitis does develop, symptoms are fever, headache, neck stiffness and sometimes petechial rash. Other systems and organs (e.g. joints, heart) may be involved. Septicaemia may occur and if so fatality rates are very high. The acute fulminating form of the disease which occurs especially in pre-school children has a high fatality rate. The laboratory diagnosis is made by isolating the organism from culture of cerebrospinal fluid or blood. Initial choice of antibiotic regime, however, is guided by immediate examination of the cerebrospinal fluid, both microscopically (after Gram staining) to attempt to identify the organism and also to carry out other tests on it. The laboratory stage is the essential step in eliminating, from diagnostic consideration, other agents which may cause a similar clinical picture. These include other bacterial forms of meningitis (commonly *Haemophilus influenzae* and pneumococcus, and in babies *E. coli*), viral meningitis, or more rarely tuberculous or fungal forms of meningitis.

**Incubation period.** Usually between 2 and 4 days, but may extend to 10 days.

**Infectivity period.** The patient is infective in the pre-symptomatic phase and for about 24 hours after specific treatment has started, but in an outbreak a large proportion of the population can become asymptomatic carriers of the meningococcus.

**Reservoir.** Man.

**Mode of transmission.** By droplet spread. Indirect infection is probably unimportant because the meningococcus is very susceptible to temperature changes and to drying.

**Control measures.** The large number of symptomless carriers means that there is little logic in isolating cases or investigating contacts. However, it is usual to isolate the case until 24 hours of treatment has been given and to observe contacts to see if they develop symptoms. Prophylactic sulphonamides or antibiotics in families of cases and closed communities may be of value. A vaccine has been used successfully in the USA. General environmental measures include the avoidance of overcrowding and the maintenance of good ventilation, particularly in sleeping quarters in closed communities containing children and young adults where carrier rates may be high.

**Information.** A notifiable disease and general practitioners should be alerted when an outbreak occurs in a locality.

### **Pertussis (whooping cough)**

**Causal agent.** *Bordetella pertussis*, a small ovoid, Gram-negative coccobacillus which is difficult to culture and grows only on special media.

**Frequency and distribution.** This occurs throughout the world. Epidemics of whooping cough tended to occur every 4 years, but since the early 1950s their size has progressively lessened. However, the epidemic of 1978 reverted to the level of the 1950s, a probable consequence of the reduction in the uptake of pertussis vaccination. In 1978 about 66 000 cases were notified (about two-thirds in children under 5 years) compared with about 16 000 in the epidemic years 1970/71 and 1974/75. Although the notifications of cases increased, the number of deaths did not. There were 12 deaths in 1978, a similar number in 1974 and 1975, and double that number in 1971.

**Identification.** The disease begins with a slow onset of an irritating cough, which progresses to paroxysmal attacks over a period of a few weeks and lasts for up to 2 months. The coughing attacks are accompanied by whooping and vomiting. Convulsions may occur in infants. Fatality rates are highest in children under 6 months. It can be difficult to diagnose and depends on the history given by the mother. Similar clinical syndromes can be produced by viral respiratory infections. Organisms can be cultured from carefully taken pernasal swabs if there is no delay in getting them to a laboratory. Fluorescent antibody methods permit diagnosis in a few hours.

**Incubation period.** Seven to ten days.

**Infectivity period.** The patient is infectious during the catarrhal stages of the illness and becomes non-infectious during the paroxysmal stage.

**Reservoir.** Man.

**Mode of transmission.** Mainly droplet spread but also indirectly from objects contaminated by fresh discharges from the upper respiratory tract.

**Control measures.** Infants should be excluded from contact with the case. In household infections, prophylactic use of antibiotics (usually erythromycin) for a younger susceptible infant should be considered. Cleansing and disinfection of articles soiled with upper respiratory discharges is advisable, as is the use of disposable tissues and handkerchiefs. Vaccination should be started at 3 months (as part of the recommended schedule in childhood – see Chapter 3). When the disease is prevalent booster doses should be given to older children.

**Information.** A notifiable disease.

## **Poliomyelitis**

**Causal agent.** Poliovirus (three serological types).

**Frequency and distribution.** The disease is still endemic in many countries of the world but effective vaccination programmes have reduced its incidence dramatically. In Britain, only sporadic cases and small outbreaks have occurred during the last decade; in the 1970s there were usually less than 10 cases of paralytic poliomyelitis in each year. The majority were in unvaccinated children under the age of five years, but one or two cases were possibly associated with the vaccine.

**Identification.** The virus produces an acute pyrexial illness in which the patient may have headache, stiffness of the neck and gastro-intestinal upset. A minority of patients develop paralysis through involvement of the motor neurons. The virus may be cultured from the faeces.

**Incubation period.** Seven to 12 days.

**Infectivity period.** Both paralytic and non-paralytic cases are infectious for about 10 days before symptoms appear and the virus is excreted in the faeces for 6 weeks or more after this. The virus can be isolated from the throat for approximately a week after onset.

**Reservoir.** Man.

**Mode of transmission.** Faecal-oral route and also airborne.

**Control measures.** Isolation of the case is essential and contacts should be given booster doses of vaccine immediately. This is one of the few diseases where mass vaccination is recommended as a control procedure. Vaccination of all children and young adults in the locality is also advisable after virological confirmation of the case. In areas with modern sewage disposal systems no environmental measures are appropriate.

**Information.** This is a notifiable disease. The MOEH notifies general practitioners and hospitals doctors to alert them to the possibility of further cases.

## **Rabies (hydrophobia)**

**Causal agent.** Rabies virus.

**Frequency and distribution.** It is found in many countries throughout the world in a variety of animals. The British Isles are at present rabies free, with only occasional imported cases in Man. Even in countries where rabies is endemic in wild life, Man is rarely affected. Rabies has been detected in wild life in various parts of Western Europe, progressively closer to ports along the English Channel.

**Identification.** It is characterized by an acute encephalitis that is virtually always fatal within a week of first symptoms. The victim is apprehensive, with headache, pyrexia and muscle spasms which progress to paralysis and death. The fear of water (more accurately of swallowing) had led to the name 'hydrophobia'. The laboratory



diagnosis of the disease in the brain of a killed infected animal confirms the clinical manifestations in the patient.

*Incubation period.* Normally two to eight weeks, but it can be longer. It depends on the dose of virus as well as the nerve supply of the area which is wounded. The virus initially remains in the tissue around the site of the bite, where it replicates before spreading.

*Infectivity period.* Although largely a theoretical risk, there is the possibility of man-to-man infection. Animals are usually infective from about five days before the onset of signs of illness.

*Reservoir.* A variety of wild animals act as a reservoir: foxes, wolves and bats. However, for practical purposes the disease is transferred to man by a dog bite (or less often a cat bite). As dogs die from the disease they are probably not the true hosts.

*Mode of transmission.* By the bite of an infected animal: the virus travels along the peripheral nerves to reach the central nervous system.

*Control measures.* Of the greatest importance are strict quarantine regulations coupled with legal penalties to prevent disease being imported. Veterinary surgeons and those who deal with imported animals should be vaccinated with the human diploid cell vaccine. Health education measures should be employed to encourage travellers to foreign countries to avoid all contact with animals, especially in those countries where rabies is endemic. An individual who has been bitten by an animal about which there is some suspicion of rabies in a foreign country should have the wound washed immediately and thoroughly cleansed under medical supervision. Anti-rabies serum may be injected around the site of the bite.

The decision whether to proceed with vaccination depends on the likelihood that the animal is infected. If the animal was not captured and rabies is endemic in the particular country, then it is prudent to proceed with vaccination. Human diploid vaccine is more effective and has fewer side effects than older vaccines. The total treatment of six doses is given intramuscularly: the first dose immediately, the second on the third day after exposure, the third on the seventh day, the fourth on the fourteenth day, the fifth on the thirtieth day and the last one on the ninetieth day. Horse anti-rabies serum is usually also given immediately and provides short-term passive immunity. There are dangers, however, of anaphylactic shock. Most recently rabies immune globulin is a safer alternative in inducing passive immunity if it is available. If the animal, for example a dog, is captured, then a

judgement can be made on its state of health. If it is kept under observation and it is infected, its health deteriorates quickly. On the other hand it may be considered advisable to kill the animal and undertake diagnostic tests on the brain. By these measures unnecessary treatment of a patient may be avoided. In the context of the British patient all these measures depend on the quality and availability of medical services in the country which is being visited.

An increasingly common occurrence as more people travel abroad, is a history of animal bite in a returning traveller. Medical care may not have been sought or may not have been available in the country concerned. Personal experience indicates that the community physician may become involved in such a situation. For example, a party of schoolchildren returning from a school trip abroad contained two members who gave a history of having been bitten by a dog that had exhibited aggressive behaviour towards them. It was only upon return to this country that parental concern led to the children presenting to the local accident and emergency department some 4 days after the bite. Through the Department of Health and Social Security, via its international links, the animal was located and found to have remained healthy. Vaccination was not performed. Post-exposure vaccination would have been commenced immediately if:

- (a) there was no information about the incident;
- (b) the animal had escaped and could not be traced;
- (c) the dog had been killed and diagnosed as suffering from rabies.

In the rare circumstances of an established case occurring in this country, because of the possible seriousness of man-to-man transfer of the disease, rigid rules of isolation must apply. There is a particular danger in transmission of the disease in human saliva and this is a risk not only to immediate family contacts, but also to ambulance staff. They should wear protective gloves and gowns and concurrent and terminal disinfection should be practised.

*Information.* A notifiable disease.

### **Rubella (German measles)**

*Causal agent.* Rubella virus.

*Frequency and distribution.* It has a worldwide distribution and is endemic in Britain with periodic epidemics in children.

**Identification.** The virus produces a mild febrile illness with upper respiratory symptoms, a fine macular rash, and enlargement of the posterior cervical and occipital glands. The disease is difficult to diagnose and in many cases is sub-clinical. Its main importance lies in the risk of the congenital rubella syndrome, which affects infants whose mothers had the disease during the first 3 months of pregnancy. At birth the infant can have a variety of defects, including cataracts, deafness, mental retardation and cardiac abnormalities. In some cases these are mild and not detected for some years after birth, at which stage it is too late to make a definitive diagnosis. Rising antibody titre can be demonstrated in paired sera with 10–14 day intervals during the 2–4 weeks following infection and specific immunoglobulin M (IgM) detected for a month or so.

**Incubation period.** Fourteen to 21 days.

**Infectivity period.** A highly infectious disease: the patient is infectious a week before and a week after the appearance of the rash.

**Reservoir.** Man.

**Mode of transmission.** Mainly airborne, but also by articles contaminated from upper respiratory discharges of the patient.

**Control measures.** It is important for pregnant women to avoid contact with cases of rubella. A vigorous vaccination programme of schoolgirls between 11 and 13 years of age and women of reproductive age having no antibodies (sero-negative) is central in the control of the disease. Until that has been in force for 10–15 years it is also imperative that older women of childbearing age should also be screened and vaccinated where necessary. There is a slight risk in giving the vaccine in the early stages of pregnancy, hence it is not recommended when there is a possibility of the woman being pregnant. However, only a small proportion of affected babies are first babies, hence vaccination of mothers after delivery in maternity wards would be a very opportune time (see Chapter 3). Staff working with pregnant women should be vaccinated (e.g. nursing staff, medical students, ambulance personnel).

**Information.** Not a notifiable disease.

### **Scarlet fever and streptococcal sore throat**

**Causal agent.** Beta-haemolytic *Streptococcus* group A. *Streptococci*

are Gram-positive, spherical in shape and tend to form chains when they grow. An important feature which determines their classification is whether or not they produce haemolysis when grown on a medium containing red blood cells ( $\beta$ -haemolytic streptococci); only partial or incomplete haemolysis ( $\alpha$ -haemolytic streptococci) or no haemolysis at all. A further classification is made on the basis of antigenic differences in the components of the cell wall; on this basis  $\beta$ -haemolytic streptococci are divided into a number of serological groups (A to O).  $\beta$ -haemolytic group A streptococci most commonly cause streptococcal sore throat, much less commonly scarlet fever. More rarely the organism can result in a number of other infections: erysipelas, impetigo, puerperal fever or bacterial endocarditis. After a delay of several weeks, infection with the  $\beta$ -haemolytic group A *Streptococcus* may result in acute glomerulonephritis or rheumatic fever. These delayed manifestations are probably hypersensitivity reactions and not infections.

*Frequency and distribution.* The disease occurs in most parts of the world, but is more common in temperate zones and in children although all ages can be affected. In England and Wales in 1980 there were 11 118 notifications of scarlet fever and five deaths from streptococcal illnesses.

*Identification.* The disease is characterized by sudden onset of sore throat, fever and inflamed tonsils, with exudate and enlarged lymph glands. The tongue has a strawberry-like appearance in the early stages of the disease. The main differential diagnosis is with viral infections of the upper-respiratory tract. If, in addition, an erythematous rash appears on the second or third day the diagnosis is scarlet fever. At the beginning of the century this disease was a major cause of death of children, but is now a milder, treatable illness. However, the streptococcus is still an organism to be regarded with respect. It can usually be cultured from throat swabs, where the  $\beta$ -haemolytic streptococcus will be seen surrounded by its characteristic zone of haemolysis. Rising serum antibody titres may be helpful in aiding diagnosis (antistreptolysin levels – usually the O antigen – or ASO titre).

*Incubation period.* Two to three days.

*Infectivity period.* Most patients cease to be infective 24 hours after the treatment with antibiotics, although in some a persistent carrier state may develop.

*Reservoir.* Man.

**Mode of transmission.** Direct contact, droplet spread and via articles freshly contaminated with nasopharyngeal secretions. Airborne spread is unlikely as the streptococcus does not resist drying well. In the past, outbreaks have occurred through infected milk.

**Control measures.** Isolation of the case is probably unnecessary because the patient becomes non-infective shortly after treatment is started, but it is usual to keep close contacts under surveillance for a few days to see if they develop the disease. In closed communities of children prophylactic antibiotics should be considered and in hospitals, children with streptococcal sore throat should be separated from other patients.

**Information.** Scarlet fever is a notifiable disease.

### **Sexually transmitted diseases**

A wide variety of sexually transmitted diseases have now been described; they are spread by sexual intercourse and other forms of sexual contact. They fall into a number of categories.

- (a) Diseases which have been well recognized for a long time, e.g. syphilis, gonorrhoea, chancroid, lymphogranuloma venereum, and *Trichomonas* infections.
- (b) Organisms (e.g. *Chlamydia*) more recently implicated as causal agents as the aetiology of non-specific urethritis becomes clearer.
- (c) Other conditions brought to the forefront by pressure groups of sufferers; genital herpes infection is a good example.
- (d) A large and increasingly recognized group of other infectious conditions which have or may have a sexual component to their mode of transmission – some are described elsewhere in this chapter. Hepatitis B infection is an example.

In this section two of the long-recognized sexually transmitted diseases, syphilis and gonorrhoea, are described in detail together with the problem of non-specific urethritis. The basic principles of control of sexually transmitted diseases are similar, although the impact of measures such as contact tracing and identification of cases is slight in many of the minor diseases. In these circumstances, problems are caused because only a small proportion of cases present to special clinics from where the focus of contact tracing is operated.

**Control measures.** The key control measure is the tracing of contacts of patients. This is a skilled exercise requiring considerable diplomacy and is often undertaken by a specially trained nurse, health visitor or social

worker working from the special treatment clinic. If possible, the address of the contact and the place where intercourse took place is obtained and the contacts, if traced, are persuaded to come for treatment. Health education programmes should include information about the symptomatology of venereal diseases and encouragement to people to come forward for treatment, discouragement of casual sexual contacts, information about personal protective measures, and emphasis that facilities for treatment are confidential. Government measures concerning the control of prostitution have been advocated as an approach to the problem.

### Syphilis

*Causal agent.* *Treponema pallidum*, a thin motile spiral organism (spirochaete) which does not stain well and is thus best seen with dark-field illumination.

*Frequency and distribution.* It occurs in all parts of the world. Its incidence increased during and after the two World Wars due to the mobility of the population, and a further increase has occurred in Britain since the mid-1950s. It is seen in sexually promiscuous young people, and today especially in male homosexuals. The number of new cases is small in comparison with gonorrhoea, but it is more common in sea ports and large cities. There were 2600 cases of early syphilis treated in hospital clinics in England in 1977.

*Identification.* There are three stages of the acquired disease. The primary lesion (chancre) develops as a painless papule on the skin or mucous membrane at the site of entry of the spirochaete, usually about three weeks after exposure. Even in untreated cases the primary lesion disappears and is followed within 6 months by a generalized cutaneous rash which is the secondary stage. The tertiary stage may not develop for some years and can affect various parts of the body, including the bones, liver, cardiovascular system and the central nervous system, giving rise to classical tabes dorsalis and general paralysis of the insane. Early treatment with antibiotics has greatly reduced the occurrence of the secondary and tertiary stages. In congenital syphilis the fetus is frequently aborted or still-born. If the child survives, handicapping conditions are the usual outcome.

The organisms may be seen in specimens under dark-field illumination microscopy or using immunofluorescent techniques. There are a number of serological tests, but these can be grouped into two types: (i) complement fixation tests (e.g. Wassermann reaction) and (ii) flocculation tests (the VDRL). The latter gives results more rapidly and is of

greatest value when examining large numbers of samples. Other tests such as the *Treponema pallidum* immobilization test (TPI) are also used.

**Incubation period.** Three weeks, but can vary from 10 days to 10 weeks.

**Infectivity period.** The patient is infectious during the primary and secondary stages of the diseases and may also be intermittently infectious during latent periods. Effective antibiotic treatment makes the patient non-infectious within one or two days.

**Reservoir.** Man.

**Mode of transmission.** Acquired syphilis is almost invariably by sexual contact. The spirochaete does not survive long outside the human body, hence the indirect methods of transmission are not important. Congenital syphilis in prenatal infection affects the fetus from the fourth month of pregnancy through the placenta.

## **Gonorrhoea**

**Causal agent.** *Neisseria gonorrhoeae*, Gonococcus: a Gram-negative diplococcus.

**Frequency and distribution.** The disease occurs in all parts of the world. In Britain it has become a very common disease with increased incidence since the mid-1950s, but the rate of increase slowed down during the 1970s. It is more common amongst promiscuous young people. There were 59 000 cases treated at hospital clinics in England in 1977.

**Identification.** The initial symptom in the male is a urethritis with a purulent discharge. The short female urethra means that symptoms may pass unnoticed. In untreated cases the disease may cause prostatitis and epididymitis in men and salpingitis in women. Rarely other organs, e.g. the joints, may be involved. The gonococcus may affect the eyes of a baby born to an infected mother causing ophthalmia neonatorum which can lead to blindness. Routine treatment at birth has, however, virtually eliminated this condition. The diagnosis is usually made by direct examination of stained smears of urethral exudate in which the organism can be identified, followed by culture of the organism. Serological tests are not at present helpful.

**Incubation period.** Two to four days, but may be up to 14 days.

**Infectivity period.** The patient becomes non-infective a few days after the establishment of effective antibiotic treatment. The non-treated patient may be infectious for years. This is particularly important as females may be asymptomatic.

**Reservoir.** Man. The asymptomatic female is an important source of infection.

**Mode of transmission.** Almost always by sexual contact. The gonococcus only lives for a short time outside the human body, so indirect methods of infection are unimportant.

### **Non-specific urethritis**

The symptoms of this condition are similar to gonorrhoea although usually milder. *Chlamydia trachomatis* plays an important role and certain strains of mycoplasma have also been implicated. In over half the cases, no pathogen is identified and initial laboratory diagnosis aims to exclude the gonococcus. The disease has been reported with increasing frequency in recent years in many countries. In England 94 000 cases were reported from hospital clinics in 1977, 75% of them men.

### **Acquired Immune Deficiency Syndrome (AIDS)**

**Causal Agent.** Nomenclature has recently been simplified and the virus which causes AIDS is now known as Human Immunodeficiency Virus (HIV). It belongs to the retrovirus group and by infecting the T-lymphocyte population it gradually destroys the normal immune response mechanism.

**Frequency and distribution.** AIDS first came to light in the USA in 1981 when increasing numbers of cases of opportunistic infection (particularly *Pneumocystis carinii* pneumonia) and unusual tumours (typically Kaposi's sarcoma) were reported in previously healthy homosexual or bisexual men. Retrospective diagnosis has enabled the identification of cases back to 1978. Haemophiliacs were another sector of the population to become infected early on, because they receive clotting factors pooled from a large number of blood donations. Intravenous drug abusers who share equipment are a further main high risk group. Early perceptions that the disease might be limited to these high risk groups have proved dramatically wrong. The WHO has recognized that AIDS has now reached pandemic proportions: there have been millions



of cases in Africa alone (where the disease is called 'Slim' because of its tendency to lead to severe wasting); incidence of AIDS has increased exponentially in the United States and has risen sharply in European countries (particularly Belgium, France and Switzerland). There has been a growing realization of the heterosexual element of transmission; in Britain women account for 3% of AIDS cases although in Africa the sex ratio of cases is equal. In the UK by November 1986 there were 599 cases with 296 deaths, and estimates of up to 100 000 antibody-positive individuals.

*Identification.* The presenting clinical features may be general – weight loss, fever, malaise, lymphadenopathy. The fully developed AIDS syndrome often involves opportunistic infections or patterns of malignancy infrequently seen in people with normal immune systems, although any one of a wide range of infections or malignancies can occur; patients can be antibody-positive for HIV but remain asymptomatic. The precise proportion of HIV-positive people who will develop AIDS is not known but early estimates of 10% are now thought to be much too low. The syndrome, once developed, has a very poor prognosis (80% dead in two years). Testing of serum for HIV antibodies is carried out in major laboratories; there may be difficulties associated with testing in smaller laboratories or with manufactured kits, such as maintaining quality control.

*Incubation period.* The precise interval between infection and sero-conversion to HIV-positive is not known.

*Reservoir.* Man.

*Mode of transmission.* The principal routes are through blood, semen or other bodily fluids, and untreated blood products. There is no evidence that the organism is ever transmitted by social contact, close proximity or sharing utensils.

There is a gradation of risk of transmission of the AIDS virus within the various sexual practices: practices such as anal intercourse, where there is a greater likelihood of exchange of blood as well as semen, are of higher risk than vaginal or oral intercourse. Exchange of saliva alone is of very low risk. These estimates of risk however are theoretical, and precise assessments are not yet possible.

Whilst early paediatric AIDS cases were mainly amongst haemophilic children, babies of HIV-positive mothers are now being born with the infection. Inoculation of blood among intravenous drug abusers who share equipment, by tattooing or piercing, and – less frequently – among health care staff by 'needlestick' injuries can all lead

to infection. Screening of blood donors makes the risk of transfusion-induced disease in the UK extremely unlikely and heat-treating of blood products minimizes the risk from this source.

*Control measures.* The prevention and control of AIDS represents a major challenge to government and health services: some would say the greatest challenge of the twentieth century. Many commentators see AIDS as the return, in modern guise, of the great pestilences of the past such as the bubonic plague or smallpox. Certainly, if allowed to progress unchecked, the disease will come to dominate the health services of most countries of the world. In the absence of a preventive vaccine or a cure, the approach to AIDS must be a balanced package of measures including: health education of the general public; counselling of cases, contacts and those found to be antibody-positive (particularly to modify their behaviour); screening of blood donors and others in the high risk groups; the protection of health care workers by implementing agreed guidelines to prevent accidental transmission, and finally the undertaking of staff training. The current health education initiative is aimed at informing people about the disease and encouraging them to avoid casual sexual encounters, restricting sex to the context of stable relationships as well as practising safer sex by using condoms and avoiding the higher risk practices. The difficulties of modifying sexual behaviour are formidable, particularly among young people who are at an age of experimentation, and to whom wrongly pitched moralistic messages may be counterproductive.

*Information.* Not a notifiable disease but information on cases should be confidentially reported to the Communicable Diseases Surveillance Centre.

## **Tuberculosis**

*Causal agents:* *Mycobacterium tuberculosis*: human type; *Mycobacterium bovis*: bovine type.

*Frequency and distribution.* Tuberculosis is endemic in most countries of the world. In Britain, there has been a dramatic decline in the number of notifications and deaths from tuberculosis during the present century (see Chapter 2 for further discussion). A concurrent decline in other infectious conditions means that tuberculosis remains an important endemic infectious disease. There were about 7000 notifications of tuberculosis in 1980 (with about 500 deaths) and over 70% had the respiratory form of the disease. More than half of these cases are sputum positive, many have large lesions in their lungs. About 10% are under the age of 15 years. Its incidence is higher in those living in urban

areas, particularly inner cities, lower socio-economic groups, those living in poor housing, certain occupations (such as mining, catering, the boot and shoe and printing industries), smokers and alcoholics.

The disease is a particular problem in the immigrant community especially that of Asian origin. In Leicestershire in 1975<sup>1</sup> the overall tuberculosis notification rate was 39.6 per 100 000, with the rate for Asians (632 per 100 000) being 74 times greater than that for non-Asians (8.5 per 100 000). The Asian notifications were generally younger than the non-Asians, but this almost certainly represents the fact that the Asian population is generally younger than the indigenous population. A slightly higher proportion of tuberculosis in Asians was non-respiratory compared to non-Asians.

*Identification.* The primary infection in childhood usually occurs without marked symptoms. It is overcome with the body's natural defence mechanisms. The lesion becomes inactive, the person recovers and acquires tuberculin sensitivity and a degree of resistance. In a small proportion of children, progressive primary pulmonary tuberculosis may ensue. Rarely, a 'miliary' form occurs in which the infection is widely disseminated through the body in the blood stream producing a serious illness in which there may be meningeal involvement. In the adult, pulmonary tuberculosis is the most important form of the disease and is a major source of infection for other members of the population. There is a clinical spectrum of severity, but many cases may present only with a persistent, productive cough. Other symptoms include lassitude, fever, loss of weight and haemoptysis. It is a chronic condition in which there is a gradual erosion of the lung tissue, with exacerbations and remissions. Diagnosis is confirmed by a chest X-ray and bacteriological examination of sputum. The adult disease is considered by many authorities to result from reactivation of lesions which have lain dormant since primary infection. A proportion of infections will also occur through the first infection taking place in adult life, but the relative frequencies of such cases are not known.

Non-respiratory tuberculosis is also of importance, particularly in the Asian population, and may affect most systems of the body. Particularly common sites are the bones and joints, the genito-urinary tract, and the lymph nodes (typically the cervical glands).

*Incubation period.* From the time of exposure to development of a primary lesion can take from one to three months, but the development of secondary lesions may take years.

*Infectivity period.* The untreated case can be sputum positive for years. However, the degree of infectivity depends on the virulence of the

organism, the closeness of contacts, the personal behaviour of the sputum-positive individual and the degree of immunity of the exposed person.

*Reservoir.* Man for the human type and cattle for the bovine type.

*Mode of transmission.* Droplets spread from an infected person; indirect spread is not thought to be important. Bovine tuberculosis is usually spread from drinking unpasteurized milk from infected cows. All cattle in Britain are now in tuberculosis-free herds.

*Control measures.* Strict isolation of the case in hospital is no longer necessary, because an appropriate chemotherapeutic regime quickly makes patients sputum-negative. Although outpatient treatment is the normal approach, inpatient hospital treatment may be indicated for certain clinical or social reasons. All contacts of the patients should be screened using chest X-ray and tuberculin testing.

People who have or have had tuberculosis show a skin reaction to protein from the tubercle bacillus (tuberculin). This is administered either as a single dose injected intradermally (the Mantoux test) or in the form of small multiple punctures of the skin (the Heaf test). In each case, the skin reaction is assessed after a specified period of time. The degree of reaction to the test is the basis for a decision on further action. Strong reactors should be referred to a chest clinic for further investigation. BCG vaccination should be offered to negative reactors as follows: the infants of tuberculous parents; contacts of open cases; schoolchildren aged between 11 and 13 years; in some parts of the country immigrants and their babies; nurses who are at special risk of exposure to infection, and laboratory workers likely to deal with sputum. The question of BCG vaccine is further discussed in Chapter 3. Pre-employment chest X-rays with regular repeat examinations are recommended for special groups for their own protection and for those with whom they may associate, such as teachers, nurses and special occupational groups already mentioned. There have been recent examples of outbreaks of tuberculosis arising in children where the source of infection has been a teacher with open tuberculosis. Mass radiology, which played a large part in reducing tuberculosis in the past, is no longer regarded as economic for use with the public at large. However, there is still a place for it amongst the special risk groups.

Screening of new immigrants to Britain should also be carried out. Now that all the dairy herds in Britain are tuberculosis-free and over 90% of milk is pasteurized, the risk from bovine infection has become very much less.

*Information.* A notifiable disease.

## Hospital infections

Since the end of World War II there has been considerable concern about the frequency of infections acquired by patients whilst they are in hospital (nosocomial infections). This is despite improved methods of sterilization of equipment and wider adoption of aseptic techniques. The factors involved in this are numerous and include the emergence of resistant strains of organisms (partly due to the increased use of antibiotics); the greater survival of patients with life-threatening illness (e.g. premature infants) who are more susceptible to infection; the wider use and complexity of surgical techniques; and the advent of modern therapies (e.g. immuno-suppressive drugs) which lower host-resistance.

In a recent survey of infection in 18 163 hospital patients (14% of the total in-patient population of England and Wales) it was found that 19.1% had infections, of which almost half had been acquired in hospital. Urinary and wound infections are especially likely to be acquired in hospital (Table 9.2). Nosocomial infections often lengthen the patient's stay in hospital with attendant economic implications, both for the individual and the service as a whole. In the 1960s, the organisms which caused most problems in hospitals were the resistant strains of *Staphylococcus aureus*. This organism is still responsible for a proportion of hospital-acquired infections, as are some types of Streptococcus. The major threat today, however, comes from the Gram-negative bacilli especially *Escherichia coli*, *Klebsiella*, *Pseudomonas* and *Proteus*. Viruses and fungi contribute to a much smaller proportion of such infections.

Although infection is human in origin, coming from other patients, staff or visitors, the source may be human or the hospital environment (e.g. dust, air-conditioning systems or instruments).

**Table 9.2 Results of a survey of infection in hospital in-patients in England and Wales, 1980**

Site of infection	Percentage of all infections acquired in:	
	Hospital	Community
Urinary	30	14
Respiratory	20	38
Wound	19	2
Skin	14	19
Other	17	27
Total No. of infections	1671	1802

Source: Derived from Meers, P. D. *et al.* (1981). *J. Hosp. Infect.*, 2 (Supplement)

The mode of transmission is variable. The most important route, however, is probably from staff to patients. Organisms which are potentially pathogenic can be isolated from the nose and throat, hands and uniform of doctors and nurses, but may also be cultured from bedding, flower-water or floors. Transfer by instruments and the airborne route are also possible modes of transmission. The air in occupied rooms is relatively free from microbes of any sort, but in some areas of hospitals the air contains many hundreds of potential pathogens so that towels etc. are frequently air contaminated. Some organisms can grow in antiseptic solutions of a type which are used to clean wounds and often assumed to be sterile. Rarely infection can arise from contaminated intravenous fluid. It is difficult to say which of the means of spread are most important; this probably varies with circumstances but when outbreaks of hospital infections are investigated it is usually found that strict standards of hygiene are not being observed by staff.

Isolation of cases and carriers is advisable. There is no single effective control measure but continuously high standards of hygiene are essential and education of staff is necessary to achieve this. Designers of hospitals should be mindful of the risk of infection at all times. A high standard of building maintenance should be observed. Strict adherence to a routine of cleaning premises is needed. When an outbreak involving a highly infectious agent occurs it may be necessary to close the ward to allow for cleaning and disinfection.

## PARASITES

### Ectoparasites

#### *Scabies*

*Causal agent. Sarcoptes scabiei* – a small mite just visible to the naked eye.

*Frequency and distribution.* The disease occurs in most parts of the world. In Britain it appears to fluctuate over a 15 year cycle. ‘The itch’, as it was known, has a long history and it may have been the condition mentioned in the Old Testament for which the treatment advised was bathing in the River Jordan (now known to have a high sulphur content).

*Identification.* Skin lesions caused by burrowing of the mite are most commonly found between the fingers, on the anterior surfaces of the

wrist and the soles of the feet. Symptoms occur when sensitization develops with a papular rash which may spread to any part of the body except the face. Itching is intense, especially in bed at night. Scratching may result in secondary infection. The diagnosis is confirmed by extracting the female mite from the burrow and identifying it under the microscope.

*Incubation period.* The initial infestation passes unnoticed until sensitization occurs about 2 months later.

*Infectivity period.* The person is infectious until effective treatment is carried out.

*Reservoir.* Man. Scabies in animals (such as dogs) does not transfer to man.

*Mode of transmission.* The parasite is transmitted by close personal contact such as holding hands or sexual intercourse. It has not been possible to demonstrate transfer by indirect means such as bed-linen or clothing.

*Control measures.* There is no need to isolate the patient after treatment, but contacts should be examined and treated if necessary. It is helpful to treat all family contacts of the patient simultaneously to avoid reinfection. The maintenance of good personal hygiene standards should also be encouraged.

*Information.* Not generally notifiable, but in Sheffield it was made a notifiable disease in 1975.

#### *The common bed bug (Cimex lectularius)*

This insect is found in temperate climates and Man is the preferred host. It lives in the crevices of walls or furniture, particularly in bedrooms, and usually seeks out the sleeping host shortly before dawn. Bugs may bite anywhere on the body, but hands, arms and head are usually the chosen sites. After feeding on blood, the insect passes liquid urine which leaves a dark brown mark on the sheets and bedding. The bugs are found when standards of hygiene are poor and in old property. They are found now only rarely in most parts of Britain.

#### *Fleas*

The association of fleas with man has a long history. For example, the plague which ravaged mediaeval Britain (the black death) was carried by a flea which, although it had the black rat or ship rat (*Rattus rattus*)

as its preferred host, would also bite man. In Britain, as in most other countries, the plague has now been eliminated by controlling the rat population and through it the flea population.

Fleas spend most of their lives in nests or burrows where their eggs hatch and their larvae find food, become pupae and undergo metamorphosis to become adults. The adult flea then seeks and feeds on the resting host before jumping off again. It could be argued that fleas are not true ectoparasites because they do not actually live on their host. Indeed, many fleas bite other than their preferred host and it is likely that Man does not fulfil this role for any type of flea. The so-called 'human' flea (*Pulex irritans*) lives and breeds in association with man usually in bedrooms, in cracks of dirty floors, unwashed bedding and unclean beds where it finds its favourite damp and cool conditions. However, improved standards of housing and hygiene and the widespread use of central heating have resulted here in its virtual extinction.

The flea which causes the greatest problem in Britain and other Western countries is the cat flea (*Ctenocephalides felis*). It prefers the warm conditions which are associated with modern centrally heated houses and seeks out the pile of closely fitted carpets and the upholstery of armchairs. It does not usually go under the clothing so that bites occur on the exposed parts of the body such as hands, wrists, ankles. The flea bites man when its natural host is absent. It is also often found on dogs. At any time there are 20 times more fleas in the environment than on the cat. The dog flea (*Ctenocephalides canis*), although closely related to the cat flea, does not bite Man so readily and is relatively uncommon, but is the dominant species on racing greyhounds. To control the flea population it is essential to treat the environment as well as the pet.

## Lice

**General considerations.** There are three types of human lice; all are members of the order Anoplura (sucking lice) and are parasites exclusively of mammals. All feed on the blood of the host and parasitize only one species, hence they are strongly host-specific. Moreover, many of the 500 known species of lice are so highly specialized that they colonize only one part of the body of their particular host.

Two genera of lice infest Man: *Phthirus* and *Pediculus*, although only one species of each is involved. When Man began to wear clothes and his hair became restricted to the head, axilla and pubic areas, human lice themselves underwent modifications. The crab louse (*Phthirus pubis*) adapted to live on the hair around the human genitalia, whilst the body louse migrated to clothing, only returning to the host to feed. The head louse became a scalp dweller, and specialized

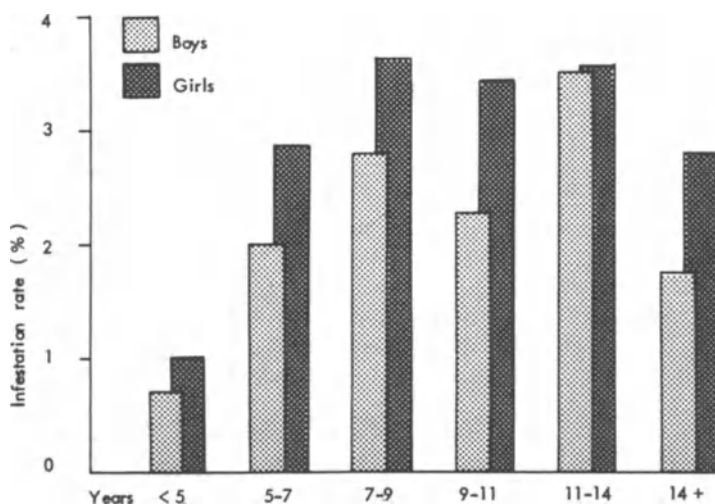


to such a degree that its survival depends on being in almost continual contact with its source of food and warmth. There are two varieties of *Pediculus humanus* – *Pediculus humanus humanus* (the body louse) and *Pediculus humanus capitis* (the head louse).

*The body louse* (*Pediculus humanus humanus*). This louse is different from the many species of Anoplura in that it lives on the host indirectly (on the clothing) laying its eggs on the seams, near the skin. It visits the body only long enough to obtain meals of human blood. The eggs are laid, attach to the fibres of clothing and, if the temperature is right, hatch within 7 days. The young louse matures in about 7 days, and has an average life-span of 30 days. It is unusual for lice to remain on the body after the clothing has been removed. However, treatment usually consists of topical application of 0.5% malathion lotion or 5% carbaryl dusting talc. A convenient way of delousing clothing is to put it dry into a tumbler-drier for 5 minutes at the maximum temperature, a manoeuvre which kills both lice and eggs.

*Crab louse or pubic louse* (*Phthirus pubis*). This parasite has preference for the coarse, widely spaced hair in the pubic area, though occasionally it may be found elsewhere on the hair of legs, beard, or eyelashes. The louse tends to feed from the same spot at the base of a hair. It is not easily visible since it blends with the skin. The eggs are glued onto the hair and hatched in about 8 days. The young louse is mature within a week. Spread is nearly always by sexual contact and the treatment of choice is the application of 0.5% malathion or carbaryl lotion to all hairy areas below the neck.

*The head louse* (*Pediculus humanus capitis*). This louse is strongly host-specific, and for all practical purposes is found in only one place; the hair, close to the scalp, of human beings. The eggs (nits) have been found on the hair of an Egyptian mummy and there are numerous references to the louse in literature from the time of the Greek classics. The head louse is about the size of a matchstick head and has a life-span of 30 days, but few survive in the natural state for so long. The eggs are laid in a glue-like medium which attaches them to a hair shaft, very close to the scalp. Usually they hatch within 7 days into a nymph which becomes mature within about 10 days. The sole food is human blood. The louse moves quickly but does not readily leave the host. The mode of transmission is almost certainly by the louse walking from one person's head to another when they are in close contact. There is little evidence to suggest that head lice are transferred by hats or combs, and it is very unlikely that furniture, seats in trains, or theatres are a source of infestation. Head louse infestation occurs throughout the world, but



**Figure 9.2** Prevalence of head louse infestation in schoolchildren in England, 1975. Source: Donaldson, R. J. (1975) *The Head Louse in England: Prevalence amongst Schoolchildren*. Health Education Council Report

it appears to be more common in Western countries. A survey<sup>2</sup> amongst schoolchildren in England in 1975 estimated an overall infestation rate of 2.45%, but girls were more affected than boys (Figure 9.2). Children in the North of England were more often infested than those in the South, similarly children in urban areas were more often affected than those in rural areas, and the highest rates of infestation were seen in deprived central zones of the big cities, where almost 10% of children were infested. Most infestations are light and the principal symptoms are itching of the scalp with consequent disturbance of sleep. Secondary infection may occur with scratching and since lice can harbour, in their intestines, bacteria capable of causing impetigo, wounds may become infected in this way.

If someone, particularly a child or young person, presents with an itchy scalp, impetigo or excoriation around the nape of the neck, head infestation must be ruled out. The eggs (nits) are firmly attached to the hair and hence can be distinguished from dandruff. The egg is laid on the hair shaft very close to the scalp and initially is greyish in colour and difficult to see. Later as the hair grows the nit becomes pearl white and easily visible. The eggs are frequently located behind the ears, although they may be found anywhere on the head. Eggs found more than a few centimetres from the scalp can be assumed to be dead. The live lice are difficult to see.

The insecticides of choice for the treatment of head infestation are malathion and carbaryl. Gamma benzene hexachloride and DDT should now be considered obsolete. Although lotions are the preferred method of applying treatment, recent trials have shown the shampoos containing these insecticides to be effective and of course they are much more acceptable to the patients. Fine toothcombing with a metal comb is a painful process and can now serve no purpose other than cosmetic, because malathion and carbaryl kill both lice and eggs. The reservoir of infestation is frequently the family, so it is important that the whole family is treated.

The most important control measure of all is public education to dispel myths and misconceptions and to discuss the subject openly. This parasite has survived in part because of a conspiracy of silence in which both individuals and whole communities have concealed the problem, hence it has been ineffectively tackled. Regular combing with an ordinary comb does much to prevent the problem because the head louse is easily damaged.

### **Endoparasites**

#### *Enterobiasis (threadworm disease)*

*Causal agent.* *Enterobius vermicularis* – a small whitish threadlike nematode (roundworm), 5–12 mm long.

*Frequency and distribution.* The disease is found in most parts of the world and is the most common helminth infection affecting man. Up to 15 million people are infected in the UK and more often these are children.

*Identification.* The patient is often symptomless but may notice the threadlike worms on the surface of the stool. The most common symptom is itching around the anus which may lead to scratching and disturbed sleep. The worm may cause appendicitis or, by migration, vaginitis or salpingitis. These complications are, however, extremely rare and the majority of patients have very mild symptoms. Diagnosis is by pressing 'Sellotape' on to perianal skin and then onto a microscope slide. Characteristic eggs are seen under the microscope.

*Incubation period.* Three to six weeks, though it may take longer before symptoms appear, because the number of worms increases with continuous self-reinfections.

*Infectivity period.* The patient is infectious for as long as pregnant

female worms remain in the gut. An individual worm lives for about two months.

*Reservoir.* Man. Similar worms in other animals do not infect man.

*Mode of transmission.* The adult worm lives in the caecum, small and large intestines. The gravid female migrates through the anal orifice and lays small sticky eggs on the skin of the peri-anal region. The eggs are then carried by the fingers to the mouth or indirectly to another individual. They are capable of survival for a few days on clothes, bed-linen or dust if conditions are cool and moist. However, person-to-person transmission is most common. The eggs, when swallowed, hatch out in the small intestine and the cycle recommences.

*Control measures.* There is no need to isolate the patient but the family and other close contacts should be screened. Simultaneous treatment of all infected members of the family is essential to prevent reinfection. In addition, there should be education in personal hygiene, frequent washing of the peri-anal region and the need to keep fingernails short and clean. The most important general environmental control measures are frequent washing of personal clothing and bed-linen. The hot cycle of the domestic washing machine is sufficient to destroy the eggs.

In institutions, the eggs may be present in dust so that a general clean up should accompany treatment of patients.

### *Giardiasis*

An increasing number of outbreaks of diarrhoeal disease have been reported due to *Giardia lamblia* (a flagellate protozoon), particularly in travellers from overseas. There were over 3000 cases in Britain in 1980. Travellers to Russia through Leningrad have been frequently infected. Although the incubation period is variable, symptoms usually occur within one to two weeks of the exposure. The main features of the clinical illness are nausea, abdominal pain and profuse watery diarrhoea. Travellers are infected from contaminated drinking water, but infection may also be transmitted from person to person by the faecal-oral route.

### *Tapeworm (cestode)*

*General considerations.* The adult tapeworm lives in the intestine of the definitive host. Segments which contain thousands of eggs are passed with the faeces. When eaten by an intermediate host the eggs hatch into embryos (oncospheres) in the digestive tract of the intermediate host,

pass through the intestinal wall and use the bloodstream to reach various organs or muscle where they develop cysts. Cysts, when eaten by the definitive host, develop in the intestine into the adult tapeworm and so the cycle is complete. Three tapeworms are described here. Preventive measures have reduced the problem in Britain in the case of two of these worms (*Taenia saginata* and *Taenia solium*) but in the third (*Echinococcus*) the situation is far from satisfactory.

*Taenia saginata* (beef tapeworm). Although it occurs in most parts of the world it is uncommon in Britain. Man is the sole definitive host of the adult tapeworm. The head (scolex) attaches to the small intestine. The worm can be up to 5 metres long and the gravid segments which are passed per rectum are basically sacs containing thousands of eggs. For the next stage of development they require an intermediate host, which in Britain is usually the cow. The eggs then hatch in the cow's intestine and the embryos (oncospheres) pass through the intestinal wall and form cysts (cysticerci) in the voluntary and cardiac muscle. When man eats raw or undercooked beef which contains cysts, a tapeworm develops. Tapeworms produce few ill-effects in man, but the passage of gravid segments can give rise to fear and embarrassment.

*Cysticercus bovis* is uncommon in cattle in most European countries with less than 1% infected in Britain.

*Taenia solium* (pig tapeworm). Even less common than *Taenia saginata* is the pig tapeworm, which is virtually absent from Britain. Its life-cycle is similar to that of the beef tapeworm and Man is infected by eating raw or undercooked pork. However the eggs can also infect Man so that he develops cysticercosis.

**Control measures** – The control measures used against both beef and pig tapeworms are similar. It is important to ensure adequate treatment of cases. The disposal of human sewage should avoid grazing land: most sewage systems do not filter out the eggs. Other general preventive measures include effective meat inspection at the abattoirs and the adequate cooking of meat. Cooking temperatures above 56 °C destroy the cysticerci, as does refrigeration of meat at –7 °C for three weeks or at –10 °C for two weeks. The rarity of *Taenia solium* is almost certainly due to better methods of pig-rearing.

*Echinococcus granulosus*. This tapeworm is found in all parts of the world. The adult worm is small (usually less than a centimetre in length) and lives in the small intestine of dogs, foxes and wolves, the definitive hosts. In Britain the main concern is with dogs and there are two well recognized life cycles which almost certainly involve different

strains of species. The first has the farm dog as the definitive host and the sheep as the intermediate host. The second involves the fox-hound and the horse. In each case the intermediate hosts (sheep and horse) acquire the infection by grazing on pastures which are contaminated with dog faeces. The eggs hatch in their intestine and release oncospheres which, via the portal circulation, reach the liver, lungs and occasionally other organs. Over a period of months a hydatid cyst may develop which is infective and if dogs eat offal containing these cysts, the cycle is completed. Man becomes involved by serving as an alternative intermediate host, acquiring the infection by handling dogs or eating salad vegetables contaminated with eggs from dogs' faeces. In man hydatid cysts are most commonly found in the liver (70% of cases) and lungs (over 20% of cases). Cysts grow slowly, taking a year to become one centimetre in diameter and ten years to reach 10 centimetres in diameter. Between 1970 and 1974, 21 people died from hydatid disease in England and 11 in Wales, but in parts of Wales it has been estimated that four to five cases per 10000 population occur annually. Human cases usually involved the dog/sheep cycle and the place of man in the dog/horse cycle is not clear, although the prevalence of *Echinococcus* in horses is around 60%.

Britain lags behind other countries in controlling the disease. In New Zealand and Iceland for example, the disease in Man has been virtually eliminated by breaking the cycle, through more stringent controls of the dog population, the treatment of dogs with antihelminthic drugs, and prohibiting the feeding of dogs with infected offal.

### *Toxocara*

*Toxocara* is a nematode (roundworm) whose adult form is about 18 centimetres long. Two species cause concern in the British Isles: *Toxocara canis* (adult form occurs in the small intestine of dogs) and *Toxocara cati* (found in the cat). Each has a complex but different life cycle.

It is the minute larvae (about 0.5 millimetre long) which invade the tissues of many vertebrates and cause symptoms in humans. Human infestation follows the ingestion of infected eggs from dog or cat faeces. The transfer may take place directly from hand to mouth (particularly in children) or possibly on salad vegetables. Surveys have shown that 5–25% of soil samples in garden, parks and sandpits are contaminated with *Toxocara* eggs. After ingestion the eggs hatch into larvae in the intestine, penetrate the intestinal wall and reach various organs through the bloodstream. The larvae do not develop into adult worms in humans, but the wandering larvae can invade lungs, liver, the brain and eye. In the various tissues larvae produce immune response and become the centre of an inflammatory action with subsequent

fibrosis and granuloma formation. In the great majority of cases this gives rise to no symptoms, but if the lesion is in a vital organ such as the eye it can lead to disturbance of vision, or in the brain it can result in epilepsy.

It must be remembered that these are rare conditions: about 50 cases with ocular involvement are reported each year, mostly children who have been in close contact with dogs. Nevertheless it is a further reason to stop streets and parks being used by dogs indiscriminately for defaecating. At least 10% of dogs in Britain are infested and up to 35% of cats, but human infection is much more commonly associated with dogs. Between 2 and 5% of the adult population in Britain have been found to be infected.

### *Toxoplasma gondii*

**Causal agent.** *Toxoplasma gondii*, a coccidial protozoon parasite found in the tissues of many animals including Man, but only in the cat is there a stage of development in the intestine. Hence the cat excretes *T. gondii* as oocysts which, when ingested by other animals, cause the disease. It may also result from the ingestion of uncooked meat.

**Frequency and distribution.** It is found in all parts of the world, both in animals and Man. In Britain up to 40% of adults have antibodies to *Toxoplasma* indicating previous infection and the vast majority show no symptoms.

**Identification.** The primary infection rarely causes symptoms which are severe enough to be reported. In its acute form, the patient has fever and enlarged lymph glands. The parasite, however, may invade other sites leading to symptoms and disability, including the conjunctiva and cornea of the eye, the eyelid and the central nervous system. Intrauterine infection, across the placenta from the mother, can lead to fetal death or birth of a severely mentally handicapped child with microcephaly or hydrocephaly.

**Incubation period.** Unknown.

**Infectivity period.** Infection from person to person occurs only in the intrauterine infection.

**Reservoir.** Many animals, particularly cats, dogs and rabbits.

**Mode of transmission.** The definitive host, the cat, becomes infected by eating rodents, birds or contaminated undercooked meat. The

parasite then undergoes a complex process of development in the epithelial cells of the cat's intestine. For a short period of time the cat passes oocysts, a stage of the parasite that can remain potentially infective in the environment for long periods. However, despite the fact that two-thirds of the cat population have been infected, only 1% are likely to be passing oocysts at any one time. It is not known how often Man becomes infected by these oocysts, but it is thought that he usually acquires the infection by eating raw or undercooked pork, mutton or beef which contains the parasite.

**Control measures.** There is no need to isolate the patient or to undertake surveillance of contacts, but general environmental measures involve care in handling cat faeces and the adequate cooking of meat.

### *Trichiniasis*

**Causal agent.** *Trichinella spiralis*, a minute threadlike nematode (roundworm) which invades the tissues of the body.

**Frequency and distribution.** Found in all parts of the world but is now an uncommon infection in Britain.

**Identification.** The clinical picture is variable, but usually there is mild pyrexia and the classical sign of swelling in the upper eyelids occurs on about the 10th day. Muscular pain and skin lesions are also present. The illness may begin with gastrointestinal symptoms and if a large quantity of larvae are ingested, severe symptoms may precede death from myocardial failure. In most cases, however, only small doses are ingested resulting in mild infections, often without the symptoms being reported. Sporadic outbreaks have occurred in Britain due to eating undercooked pork or uncooked pork sausages.

**Incubation period.** Ten days.

**Infectivity period.** The parasite is not transmitted from man to man but infected meat can remain hazardous for a considerable period unless adequately cooked or stored for about 3 weeks in a freezer. Most but not all meat curing processes are sufficient to destroy the larvae.

**Reservoir.** Pigs, dogs, cats, rodents and many wild animals.

**Mode of transmission.** Man acquires the infection by eating raw or undercooked pork or pork products, especially sausages.



**Control measures.** Isolation of the case is unnecessary and surveillance of contacts is necessary only in order to detect and treat those who may have eaten the same infected pork. Aside from ensuring that pork and pork products are adequately cooked, the most important general control measure is to prevent pigs from becoming infected. This can effectively be achieved by boiling swill before feeding it to pigs. The larvae are quickly killed at 55 °C. Present methods of pig-rearing make it unlikely for pigs to acquire infection from rodents or other wild life; indeed it is very unusual to find an infected pig in a British abattoir today. A strict refrigeration regime can eliminate infection from pork.

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## Environmental health

### INTRODUCTION

This chapter deals with the physical environment. It describes the practice of environmental health, the purpose of which is to maintain and improve the human ecosystem by promoting the beneficial environmental components and reducing or eliminating the hazardous ones. Unlike most other species, Man has developed the ability to manipulate his environment. Whilst his endeavours have usually been directed at producing a beneficial effect, they have frequently been accompanied by adverse changes.

If the size of a country's population outstrips the capacity of the land to feed it, then the choices are starvation or industrialization. Since the thirteenth century, Britain has been unable to support its population from its own resources, and as the population has increased this has become more evident. Industry, necessary for the health and well-being of a population through the provision of resources to support a better diet, living standards and services such as health and education can give with one hand, but take away with the other. A population which abandons the pastoral life associated with an agricultural economy will find itself largely in crowded noisy towns and cities breathing air of indifferent quality.

The study of the effects of disease in populations is easiest when a high proportion of people are affected following high exposure to specific agents. The medical effects of exposure to heavy smog, high radiation levels and intense noise have all been well documented. What remains unclear is the effect of low doses of pollutants over a long period of time. Apparent associations may be claimed, but the population is exposed to so many potential hazards that it is often impossible to prove a causal relationship between an individual agent and ill health. Many agents in the environment may indeed, for example, be carcinogenic, but are relatively weak and probably give rise to only a small number of cases.

The evaluation of adverse factors in the environment solely in terms

of outcome measures such as morbidity or mortality neglects other important considerations such as 'quality of life', admittedly more nebulous and difficult to quantify. For example, as will be discussed later, the small proportion of the population who become highly annoyed by relatively small levels of environmental noise do not die or contract specific diseases, but undergo considerable discomfort.

Another central issue in modern environmental health is whether or not there are acceptable levels for given pollutants, particularly with some of the agents which are suspected carcinogens. Certainly if the aim were to eliminate entirely all pollutants then the cost would be prohibitive.

The present state of medical knowledge of the impact on a population of environmental noise, air pollution and radiation will be described in the light of these limitations.

In the chapter, the validity of the historical association between housing and health is also re-examined. Methods of water supply and means of sewage disposal and effects on health are described, and the influence on health of heating, lighting and ventilation at home and at work are also discussed.

Many central and local authority departments contribute to the quality of the physical environment. However, when local environmental conditions affect health, the specific responsibility for monitoring and control is usually vested in environmental health officers (EHOs). Their range of duties and training is briefly considered.

In the past the medical profession was very much in the forefront of the fight against environmental evils, but nowadays the skills of chemistry, engineering and physics are equally or more in demand in addressing many of these hazards.

## **WATER**

Contamination of the water supply in the past has been a major cause of disease and death. It was the provision of a safe water supply, together with proper disposal of sewage, that constituted the triumphs of the public health pioneers of the last century.

Water can be an important route for the spread of diseases such as cholera, enteric fevers, amoebic and bacillary dysenteries, infective hepatitis and helminthic infections. The main principle in preventing the transmission of water-borne diseases is to prevent human and animal excretions from contaminating water that is intended for human consumption. It is never possible to guarantee that this will not occur and hence water supplies routinely undergo purification treatment.

Environmental Health Officers have responsibilities for testing the

purity of water at different stages of its delivery to the customer, but nowadays engineers have the main concern for the provision of water supplies. Water authorities are responsible for ensuring that supplies are adequate and of suitable bacteriological and chemical quality. Today, by international standards, the quality and safety of water for the consumer in Britain is very high. Current issues relate to the levels of lead due to plumbosolvency, and the use of fertilizers, weed-killers and other substances on land which may contaminate the water supply. Also the recycling of water can concentrate certain micro-pollutants.

### **Sources of water**

In the natural cycle, water on the surfaces of the sea, lakes, rivers and land is evaporated by the sun and subsequently precipitated as rain or snow. On the ground a substantial proportion again forms surface water in lakes and rivers and ultimately returns to the sea. Some passes into the soil where it supports vegetable life. The remainder percolates through the pervious strata until it reaches the impervious layers of the earth where it collects as underground water to supply springs and deep wells. The height of the water table is dependent upon geological factors.

Water is an excellent solvent for most gases and many solids and also carries other substances in suspension. Rain water is moderately palatable, but is an unimportant source of supply because of difficulties of collecting it in adequate quantities. It contains dissolved carbon dioxide and if it falls over urban areas may also acquire pollutants from the atmosphere. Although originally free from pathogenic bacteria it can, of course, be contaminated during collection and storage.

Surface water is the main source of supply in Britain. Water flowing over the ground dissolves minerals and can carry suspended matter as well as bacteria, algae and various other plants and animals. Upland surface water in natural lakes and man-made reservoirs is relatively free from contamination by human and animal life and is thus generally safe and moderately palatable. On the other hand rivers, which in the past were major sources of supply, become more polluted as they flow from their origins to the sea. Their water must be regarded as unsafe, especially where sewage gains access. In some parts of Britain it is necessary to draw on sources from the lower reaches of rivers. Here there is considerable contamination and full purification treatment is therefore necessary. Nevertheless, progress has been made over recent years in improving the quality of the river-water, mainly through minimizing the discharge of domestic and noxious industrial waste into it.

Underground water from deep wells and boreholes contributes only

slightly to the public water supply, but is frequently mixed with water from other sources. It is usually water of good quality, almost free of organisms or suspended solids, contains a variety of dissolved minerals and is hard. Most people find it palatable.

### **Monitoring the quality of water**

Water for human consumption undergoes regular physical, chemical and bacteriological tests.

Physical properties such as taste, colour and smell are high priorities in determining acceptability, though they may have little bearing on whether water is safe to drink.

Chemical analysis to determine the type and importance of various chemicals present in water is well established. The presence of nitrogen compounds, either as inorganic ammonium nitrate and nitrites or in its various organic forms, reflects different stages in the decomposition of organic matter in water. High concentrations of chlorides suggest contamination by sewage. Calcium and magnesium salts are an indication of the hardness of the water. The absence of dissolved oxygen is strong evidence of heavy pollution. In addition, chemical analysis may reveal the presence of small quantities of potentially dangerous substances, such as inorganic lead.

Bacteriological examination is based mainly on isolating and quantifying coliform organisms. *Escherichia coli* is regarded as an indicator of human or animal faecal pollution.

### **Purification treatment**

The aim of purification is to remove pathogenic bacteria, harmful chemicals, suspended matter and any substance causing colour, odour or undesirable taste.

There are several methods of water purification but the one described here is that commonly used in Britain.

Water is first strained (to remove solid objects) and then stored in a reservoir to allow sedimentation. If tiny particles of suspended matter which colour the water remain and do not settle, the process is aided by chemical coagulants such as aluminium sulphate (which form floccules and render it clear). The next step in the purification process is filtration through either slow or rapid filters. Slow sand filters consist of sand resting on layers of graded gravel. The active part is the slime (algae, worms and suspended substances) which forms on the surface, trapping fine suspended matter (including bacteria) and also oxidizing organic matter. When this biological film becomes thick enough to prevent flow, it must be removed but is subsequently reformed. Rapid sand filters, which are more widely used, are made of coarser sand that allows water to flow through more quickly. In their case, regular

cleaning stops the biological layer from forming, although water is often chemically coagulated beforehand so that the floccules act in a similar, though less efficient, way. Bacteria can pass through and their destruction depends on the next phase of purification: disinfection.

Chlorine is the most widely used disinfecting agent and is automatically delivered by modern equipment in a dose sufficient to kill bacteria without altering the taste of the water. A residual level of chlorine is maintained as a precaution against post-treatment bacterial contamination. Other substances may be added to the water to improve its quality: copper sulphate controls the growth of algae in reservoirs; hard water can be softened by the addition of lime; excess iron is removed by oxidation.

### **Distribution of water**

After purification, water is held in service reservoirs which usually hold several days' supply. Mains pipes made of cast iron, steel, asbestos or rigid PVC are sunk at least 3 feet in the ground (to avoid damage by frost) and to take water to service pipes. Most houses in Britain contain a storage cistern in the roof space which supplies all hot taps and in some cases cold taps. There is at least one cold tap in the kitchen which is connected directly to a service pipe.

About 200 litres of water per person per day is used for all domestic purposes including drinking, washing, cooking, flushing toilets, car washing and garden watering.

The whole process of water supply, purification and distribution is shown in Figure 10.1.

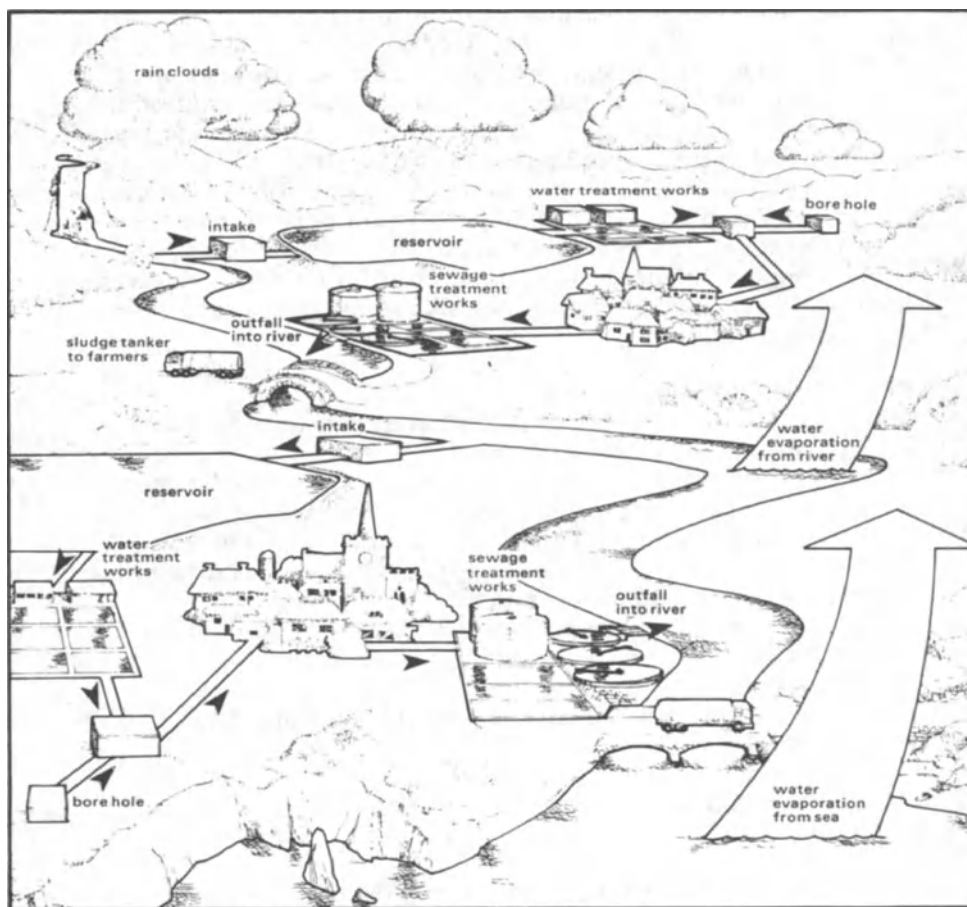
### **Water and health**

#### *Dental health*

For about 60 years it has been known that the presence of fluoride at about one part per million in the drinking water protects against dental caries, but high levels cause mottling of the dental enamel of the teeth. Small amounts of fluoride occur naturally in most water which is in contact with the Earth's rocks and many countries add fluoride to their water supply at a level of about 1 mg/litre. Unlike some other substances that are added to water the addition of fluoride has caused great controversy (see Chapter 3).

#### *Cyanosis in infants*

This is caused by high levels of nitrates in the water. Methaemoglobin-aemia occurs in bottle-fed babies if the nitrate content of the water is high. It is a rare occurrence usually associated with surface water from farmland, treated with a fertilizer, gaining access to the water supply,



**Figure 10.1** The process of water supply, purification and distribution.  
Source: *Which?*, January 1980

most often in times of drought. During the dry summer of 1976 in some rural areas (especially East Anglia) it was thought prudent to supply bottled water to infants.

#### *Hardness of water and cardiovascular disease*

This subject has been investigated for the last 20 years by epidemiological studies, many of them showing a negative correlation; in other words hardness of water has a beneficial effect. However, other studies have shown no such correlation and it has been suggested that the

climatic conditions, not drinking water, may account for the regional differences in mortality.

#### *Other health problems associated with water*

Other studies are continuing to investigate postulated adverse effects of trace elements (such as copper, arsenic, beryllium, lithium) on various diseases such as cardiovascular disease and neural tube defects. With the present state of knowledge active intervention to change the composition of the present water supply could not be justified.

#### **Water authority workers**

Workers in water authorities are medically examined before employment and also undergo bacteriological investigation of stools and Widal testing to detect carriers of enteric fever. Washing and sanitary facilities of high standards are mandatory for such workers.

### **SEWAGE AND REFUSE DISPOSAL**

The quantity of domestic sewage is roughly equal to the amount of water used, as it consists of over 99% water with dissolved and suspended solids, mostly organic matter. It contains large numbers of intestinal organisms and is therefore potentially hazardous. The objective of sewage disposal is to convert it into a liquid effluent of an acceptable standard of purity. It can then be returned to rivers or the sea whilst the solid matter is transformed into sludge which can be disposed of safely.

The composition of industrial waste varies but may contain toxic inorganic and organic chemicals. Some wastes therefore require pre-treatment before they are discharged into the domestic sewage system or directly into rivers.

#### **Sewage treatment**

There are a variety of ways of treating sewage in addition to the standard and widely used method described here.

Sewage is first screened to remove large objects and disperse large solids before it passes into sedimentation tanks, where further separation occurs. The next stage of biological treatment utilizes aerobic bacteria present in sewage to oxidize the organic matter. One way is to use filter beds where a film of aerobic bacteria acts similarly to the process used for purifying water. However, it is slow and more often the *activated sludge* method is employed. Here, in aeration tanks, the sewage is vigorously agitated or air is bubbled through it to encourage the growth of aerobic organisms. It then passes into settling tanks from which the sludge is removed and the purified effluent is dis-



charged, usually into rivers. Most activated sludge from sedimentation tanks is returned for reprocessing and supplying bacteria to keep the process active.

There are a variety of methods of dealing with the liquid sludge, which still contains over 90% water. A frequently used and economical method involves putting the sludge into closed tanks to undergo anaerobic fermentation. The gas given off consists of 70% methane and provides the sewage works with an energy source. The resulting digested sludge is then dried, either in lagoons or by mechanical pressure. What remains is then normally free from unpleasant odour and may have uses as a fertilizer. However, there are problems in some cases because of contamination with heavy metals; hence there is a need for it to be monitored.

Not all sewage treatment in Britain is satisfactory. If raw sewage or inadequately treated effluent is passed into rivers the oxygen is used up by the large number of aerobic bacteria. Plant and animal life may be destroyed. Heavily polluted water has its characteristic offensive smell because of the release of hydrogen sulphide. A standard test on which national and international standards are based measures biochemical oxygen demand (BOD), an indicator of the organic content of the liquid.

### **Pollution of sea water with sewage**

Raw sewage (sometimes macerated) from many seaside towns in Britain is discharged into the sea. The convenient proximity of the sea saves many authorities the expense of providing proper sewage works. Outlet pipes are laid past the low-tide mark and positioned to avoid currents and tides which would wash the sewage ashore. This is not a satisfactory method of dealing with sewage. In spite of considerable dilution and the mild disinfectant properties of salt water, the sea becomes contaminated.

A sub-committee of the Public Health Laboratory Service in a report published in 1959 but still, according to its authors, valid in 1970, considered several diseases which might possibly be contracted from polluted sea water. The report, which did not identify locations, describes only one epidemic, of typhoid, that could definitely be ascribed to bathing in and swallowing contaminated water and that was in extraordinary circumstances. The organisms were present in the water in abnormally high concentrations only because sewage from a hospital in which cases of typhoid were being treated was being discharged into the sea only 100 yards from the inlet of the pool in which the infected people had been swimming.

The same report quoted four cases of paratyphoid which were considered to be caused by swallowing not just water, but undisintegrated

faecal matter. Thus, epidemiological evidence would appear to show that the risks of bathing in contaminated sea water are not great, although the practice is clearly not to be recommended.

It is exceptional to find such published material in which individual areas are identified. A study of the bacteriological quality of sea water in Redcar, Cleveland was published in 1972<sup>1</sup>. Coli (*E. coli*) was used to indicate faecal contamination. No agreed standard of 'maximum concentration for safety' exists, although various suggestions have been made ranging from 100 coliform organisms per 100 ml of water to 10000 organisms per 100 ml. At Redcar, taking the entire 18 months study period, the median level of contamination was 3500 coli per 100 ml. With onshore winds and an ebbing tide, particularly in the months of August and September, the bacterial levels exceeded 10000 organisms per 100 ml, the highest of the maximum levels for safety suggested in the literature.

Although there was no firm epidemiological evidence to indicate that bathing on Redcar beach had ever resulted in the contraction of disease, the level of pollution was regarded as unacceptable and urgent action was recommended.

### **Sewage workers**

Workers in the sewage industry run special risks of becoming infected and should be regularly examined. They are at special risk of leptospirosis carried by rodents (Chapter 9).

### **Domestic refuse disposal**

About 80% of the contents of domestic dustbins in England is disposed of by controlled tipping. Incineration is also used either entirely or after separation of the contents. Controlled tipping is carried out on land distant from centres of population so that it fills in hollows in the ground (land-fill sites). Efforts are made to avoid causing nuisance. The layer of refuse is covered each day with soil or other inert material, thus it is sandwiched between layers of soil. The organic material is broken down by aerobic and anaerobic bacteria generating heat. Precautions are, therefore, taken to avoid the risk of fire by proper sealing of the tip – a process which also reduces odours. Measures are also in operation to reduce the breeding of insects or rodents. Controlled tipping has the value of reclaiming low-lying ground and properly done is neither dangerous nor offensive.

In recent years there has been increasing interest in the recovery of useful material from domestic and industrial refuse. Waste paper, glass, textiles, food wastes and metals have all proven to be reusable. Indeed, some authorities have established economically viable schemes.

A small amount of industrial waste is toxic and dangerous and has to be transported under special conditions to designated sites.

### **Authorities responsible for water, sewage and refuse disposal**

In 1974, coinciding with the reorganization of the NHS and local government, nine new regional water authorities were established in England and one in Wales. They assumed responsibilities (previously held mainly by local authorities) for the conservation and supply of water, disposal of sewage and also subsumed the duties of the river authorities. The Department of the Environment is the main Government department involved but the Ministry of Agriculture, Fisheries and Food also has a responsibility, particularly in relation to river pollution.

In England refuse collection falls under the aegis of local government district councils and refuse disposal is a function of county councils. In Wales district councils are responsible for both collection and disposal.

### **NUISANCE**

The term 'nuisance' has been used in public health legislation since the first Sanitary Acts in the last century. Nuisances were thought to be responsible for ill-health at a time when it was believed that odours were the cause of disease. Even today, in much of the public health legislation the term is linked with the phrase 'prejudicial to health'. It is now recognized that health is less directly involved and nuisances are concerned with physical and psychological discomfort; thus their removal provides a better environment and improves the quality of life. Local authorities have an obligation placed on them by various Acts to take action to abate 'statutory' nuisances. Examples of statutory nuisances are the accumulation of rubbish, insanitary premises, effluent from a trade, and keeping animals in a way which interferes with the amenities of a locality.

When a complaint about a nuisance is made to the Environmental Health Department or when one is detected, the Environmental Health Officer usually attempts to deal with the matter informally. If this is unsuccessful and the local authority is satisfied that a nuisance exists, an Abatement Notice is served upon the person responsible. If no action is taken as a result of the notice, the local authority may take court proceedings. The court may issue a nuisance order which, if not complied with within a specified time, renders the responsible person liable to a fine. Furthermore, the local authority may carry out any remedial measures and recoup the cost from the person causing the nuisance. Public health legislation allows as a defence 'best practical

means'. For this the defendant has to demonstrate that he has taken all reasonably practical measures after making allowances for the financial implications of such action and the current state of knowledge.

However, proceedings for the abatement of nuisances do vary depending on the nature of the nuisance. Although most nuisances are dealt with as violation of statute law, it is also possible to take action in common law.

## **NOISE**

Noise is an unwanted sound which causes discomfort to the listener. Sound is a transmitted form of energy and differs from environmental pollutants caused by physical agents, for example, smoke in the atmosphere. Man-made sources have made the modern environment much more noisy. Although convincing evidence of the adverse effect of environmental noise on health is difficult to obtain, there is little doubt that a noisy environment affects the quality of life of many people. On the other hand, noise has a beneficial effect in providing arousal, stimulation and alerting to danger.

### **Numbers affected**

A survey of member countries of the European Economic Community found that 45% of the population were exposed to high environmental noise levels from road traffic, 30% from intermittent industrial noises and 2% from aircraft noise.

### **Source of noise**

Noise is either naturally-occurring (e.g. thunder) or man-made (e.g. traffic). There has been a substantial increase in noise from man-made sources during the last hundred years.

Noises from the following sources commonly cause annoyance: aircraft, road traffic, industry and construction, trains, musical instruments, radios, barking dogs, shouting, singing, neighbours (especially their children) and parties.

### **Measuring noise**

Pressure, frequency and loudness are the three characteristics of sound which are of importance when assessing noise.

**Pressure.** Sound is transmitted through the air in waves giving rise to positive and negative fluctuations in pressure. The difference between positive and negative pressure is known as amplitude. Sound level meters measure pressure on a scale expressed in decibels (dB), which is

logarithmic so that, for example, decibel readings from two noise sources cannot be added together arithmetically to produce the total sound. Meters used to measure environmental noise are calibrated so that the zero decibel point is the lowest pressure audible to the human ear.

Table 10.1 shows sound pressure values for some common sounds.

**Table 10.1 Sound pressure values for various sources**

<i>Source of sound</i>	<i>Sound pressure (dBA)</i>
Low-flying jet aircraft	150
Heavy industrial noise	100
Loud shout	100
Car engine	80
Normal conversation	50
Whisper	30

**Frequency.** Frequency is dependent on the length of the sound waves, hence their rate of repetition. The higher the frequency, the higher the pitch of the sound. Very low frequencies and very high frequencies are not audible to the human ear.

**Loudness.** This is the listener's impression of sound and is not a measurable quantity, although it is closely related to sound pressure and changes in frequency. From a practical point of view an increase in meter readings by 10 dB is roughly equivalent to doubling subjectively the loudness of sound.

To allow for varying responses to sounds of different frequencies, sound level meters incorporate electronic circuits which simulate the function of the human ear. Most meters have two scales to differentiate between ranges of frequencies. However in practice the so-called 'A scale' is most used and is recorded as dBA. For aircraft noise the D scale is used (dbD).

The average sound level over a given period of time is measured by an index known as the continuous equivalent sound level ( $L_{eq}$ ). Special indices exist to monitor different sources of noise. For example, when assessing aircraft noise the 'noise and number index' (NNI) is used; it is derived by combining the number of aircraft with the noise from each aircraft in a given time.

**Legal aspects**

The main control measures for noise are contained in the Control of Pollution Act 1974. Many complaints made to Environmental Health Departments are handled informally, although a proportion end in legal proceedings. An occupier of any premises may also bring before the courts a noise nuisance directly (without involving the Environmental Health Department) and the court may make an order to abate the nuisance. The 'best practicable means' defence (see section on Nuisance, this chapter) is available. Noise nuisance can also be dealt with in common law and although the process is lengthy, the 'best practicable means' defence is not available to the defendant.

The Act also makes provision for the establishment of *noise abatement zones* by local authorities with the approval of the Secretary of State. The noise abatement zone is a recent innovation which has similarities with the smoke control area for atmospheric pollution. Levels of noise from premises within a zone are monitored and it is an offence to exceed specific limits without permission. However, the main objective is to bring about a general reduction in existing noise levels and to prevent increases in noise which might arise from new developments.

Aircraft noise is excluded from the Control of Pollution Act and operators are specifically protected from prosecution under the Civil Aviation Act 1949. However, people who live near major airports or trunk roads in Britain may qualify for grants towards the cost of sound insulation.

**Control of noise**

There are a variety of approaches to the control of noise. In industry, the operation of machinery may be modified, a less noisy type installed, or the ears of workers may be shielded by protectors. Screening of the source will reduce transmission through the air or it may be moved entirely to a site away from residential properties.

Double glazing can improve the internal environment, but sometimes when dealing with highly sensitive individuals the solution lies in rehousing them away from the noisy location.

Many lessons can be drawn from the 'quiet town' experiment operated in Darlington between 1976 and 1978. Noise abatement zones were introduced, heavy vehicles excluded from some central areas and legal measures enforced to control nuisance. However, the main thrust of the scheme was education. The population were made aware of the 'quiet town' by newspaper articles, leaflets, road signs, lectures, radio and television. The Darlington experience showed that much of the source of annoyance and complaints regarding noise related to standards of public behaviour: shouting, singing, banging of car

doors, noise from children. At the end of the period, a quarter of those interviewed had been persuaded and thought that others had been similarly persuaded to do things more quietly. The organizers seemed reasonably satisfied with the limited achievement in view of the relatively small amount of resources available.

Other surveys show that people are often the chief culprits rather than traffic or aircraft noise and it is often noise of an intermittent character which causes most problems. Some of these studies highlighted the deficient sound-proofing between adjoining houses, pointing to the need for more rigid enforcement of building byelaws.

### **Effects on health**

It is difficult to generalize from the wide range of literature which has described the effects of noise on hearing, sleep, communication, work and leisure as well as other general physiological and psychological parameters. There is a lack of convincing evidence of definite hazards to health from environmental noise. On the other hand, there is ample indication of very high degrees of annoyance caused to sections of the population.

There is a substantial subjective element in response to noise: broadly 20% of people appear to tolerate high levels of noise without complaint, but about 10% express great annoyance with even low levels of noise. The concept of annoyance reflects the attitude of the individual, the source, duration, and intensity of the noise, as well as the time of day or night in which it occurs. The problem is enhanced where the noise is perceived as dangerous, for example, the fear of an aircraft crashing.

### *Hearing loss caused by noise*

When measuring the effects of noise on hearing it is important to remember that loss of hearing is a common accompaniment of ageing (presbycusis). Occupational deafness occurs in noisy industries only after fairly lengthy periods of exposure, although more rarely permanent deafness may follow a single loud explosive sound. Transient deafness (temporary threshold shift) may also be the sequel of exposure to a sudden loud noise or to prolonged intense noise.

There is agreement that hearing loss is not generally caused by environmental noise, although some concern has been expressed about possible damage to hearing by prolonged exposure to the level of noise exposure in discotheques.

### *Sleep and noise*

From studies on sleep it appears that a continuous equivalent noise level of about 35 dBA inside the room does not disturb sleep. Above

this level, particularly with a rise of a full 10dBA, disturbance of the pattern of sleep appears, although there is considerable individual variation. Poor task-performance may follow sleep in a noisy environment.

### *Interference with work and leisure*

Although it is difficult to quantify, noise appears to have an adverse effect during rest, relaxation and study periods. Ordinary conversation, listening to the radio, television viewing or talking on the telephone begin to be affected when a continuous equivalent sound level above 50dBA is recorded indoors. Conversation outdoors is affected with equivalent sound levels above 65 dBA.

### *Noise and stress*

In the experimental situation, noise affects humans physically in many ways, including changes induced in the circulatory system and alteration of skin resistance, but the long-term effects are inconclusive. Environmental noise which produces a high degree of annoyance in a section of the population can interfere with periods of rest and relaxation and produce stress. Some studies around airports in Britain and elsewhere have claimed a higher rate of mental illness than normal and an increase in cardiovascular disease. One study in Japan suggested that aircraft noise affected fetal development, though in many such studies the findings are questionable because of the nature of the study populations and the choice of control groups.

More hard evidence is needed, but there is little doubt that the quality of life for a section of the population would be considerably improved if noise levels were reduced.

## **VENTILATION, HEATING AND LIGHTING**

### **Ventilation**

The external air contains about 78% nitrogen, 21% oxygen, 0.03% carbon dioxide, 1% inert gases, a variable amount of water vapour, (usually about 1%) and, in urban areas particularly, various pollutants.

The composition of air inside buildings and rooms depends on the amount and type of human activity. Respiration and combustion both use oxygen and produce carbon dioxide and water vapour. At one time it was believed that a reduction of the oxygen level and an increase in carbon dioxide produced discomfort and stuffiness in crowded rooms. However, lowering the oxygen level and increasing the carbon dioxide level to well beyond what would naturally occur does not cause dis-



comfort. The important factors are temperature, humidity and the amount of air movement. The air in crowded enclosed spaces also contains micro-organisms, some of them pathogenic, though the concentration is much greater in hospital wards.

The human body regulates its temperature by losing excessive heat to the surroundings by radiation, convection and evaporation from the skin and the lungs. Convection currents and evaporation of sweat are the important means of dissipating excess heat, a process whose effectiveness depends on the ambient temperature and the humidity and movement of the surrounding air. Good ventilation, therefore, consists of ensuring adequate air change, preventing harmful products of combustion entering the atmosphere and maintaining comfortable temperature and humidity. This can be achieved by having a temperature about 18 °C (65 °F) and relative humidity between 50 and 70% (relative humidity is expressed as a percentage of the amount of humidity at saturation point). The amount of moisture held by air varies with its temperature. The higher the temperature, the higher the level of humidity that can be achieved. A sensation of increased comfort can be produced by air movement at different speeds and in different directions, but without draughts. The sensation of draught is brought about by changes in temperature as well as speed, although air velocities in excess of 3 feet per second (0.9 metres per second) alone give the sensation of draught. Thus, for maximum comfort air speeds of around 2 feet per second (0.7 metres per second) are optimal. Added comfort is obtained by variations in temperature of 1 or 2 °C in different parts of the room.

### *Means of ventilation*

Natural ventilation by means of windows, doors and other openings is the most frequently used means in domestic and occupational situations. Inward and outward flow of air is dependent on differences between internal and external temperatures, external air movement and diffusion of gases. Warm air has a lower density and tends to rise just as the denser, cool air falls. An open fire draws in more air than needed for combustion so that a room with such a fire may have an air change of up to 5 times an hour, producing draughts, an effect which can be minimized by restricting the chimney opening. The open fire works in effect as an exhaust ventilator. Additional aids to natural ventilation are cowl or louvred openings on roofs. If the cowl rotates with external air movement it also acts as an exhaust fan.

Mechanical ventilation is necessary in large buildings which cannot be adequately ventilated by natural means. A number of artificial ventilating systems are used, varying from simple extraction to complex air-conditioning. Air may be extracted by extractor fans and

usually inlets are sited so as to ensure ventilation of all parts of a building. Alternatively, air can be forced into the building and often this is combined with equipment to clean the air and to regulate temperature and humidity (this is known as air-conditioning). The flow of air is controlled to avoid draughts and adequate openings are provided to ensure ventilation in all parts of the building. Mechanical ventilation can also include a combination of input and exhaust systems. Artificial ventilating systems require maintenance because of the collection of dust and dirt from the air intake, but it has been shown that this equipment is frequently badly maintained (see also Legionnaire's Disease, Chapter 9).

### *Standards of ventilation*

Ventilation requirements for inhabited buildings are laid down in a number of Acts and Regulations in considerable detail. Minimum standards are required for the heights of rooms, cubic space, ratio of floor area to window and window-opening area, all of which depend on the number of people likely to occupy the building. In addition there must be special provisions for ventilation of other rooms like larders, WCs, common stairways and passages.

The British Standard Code of Practice sets out minimum rates of fresh air supply for people in different situations and for various locations. For example, about 600 cubic feet per person is the recommended minimum for average size living rooms and bedrooms.

Only in exceptional circumstances will deliberate disinfection of the air be undertaken: good ventilation is usually preferable.

### **Heating**

The optimum ambient temperature for comfort varies to some extent with the individual and the type of activity undertaken. However, temperatures around 18 °C (65 °F) suit most people. Extremes of hot or cold conditions affect work and leisure and in exceptional circumstances can cause death.

The open coal fire is still popular in Britain, though during the last 20 years it has been replaced by more efficient methods of heating. The main objection to the open coal fire is its inefficiency: only about 30% of the heat value of the coal is utilized. Moreover, it causes pollution of the atmosphere. As already mentioned it can cause excessive ventilation and give rise to draughts and because most of the heat is given off by radiation, the distribution is uneven. Modern appliances which burn coal increase efficiency by utilizing the convection of air and by restricting and controlling the air supply; in some, the aesthetically pleasing open fire effect can still be maintained. Most of these appli-

ances burn other solid fuels, particularly the smokeless variety, with a high level of efficiency.

The other main fuels in Britain are gas, electricity and oil. All have their advantages and disadvantages, but in the last decade the introduction of natural gas has given it a lead in popular use for heating both industrial and domestic premises. Some form of central heating is almost universal in new housing developments. In some places district heating systems are installed; a central boiler provides the heating for all units in a locality, usually transferred by well insulated hot water pipes. Though these schemes sound attractive there have been a number of practical difficulties: leakages and heat loss on distribution points, dissatisfaction due to loss of choice by consumers, inefficient measuring devices and other technical faults.

### **Lighting**

Over 80% of manual activities involve vision, and vision is improved with good illumination, an especially important consideration for elderly people with impaired vision.

The legislation which relates to ventilation operates also to ensure adequate natural lighting. In addition, other legislation lays down standards of illumination for various places of work. The Illumination Engineering Society also publishes suggested standards of illumination, covering a wide variety of domestic and occupational locations.

### *Units of illumination*

The *lumen* (lm) is the illumination produced by a standard candle; the metric equivalent which is now used is the *lux* (lx), defined as the illumination of 1 lumen per square metre. Meters used for measuring illumination incorporate a photoelectric cell and give readings in lux. 'Daylight factor' is the percentage of the daylight illumination in a room compared with an unobstructed illumination outside, excluding sunlight. Usually the external illumination varies with the time of day but the ratio of internal and external readings remain fairly constant. Daylight is a combination of direct light from the sky and external and internal reflected light. The 'sky factor' is also used in recommending standards of daylight and is expressed as a percentage of illumination received direct from the sky to that from the unobstructed external hemisphere. It can be measured arithmetically by the amount of sky actually visible from a point in the room.

### *Artificial light*

This should be of a quality and quantity sufficient to provide general environmental brightness for the particular activity being undertaken. It should be free from glare or flicker and be uniform, so avoiding

contrast and dark shadows. Modern fluorescent lighting is now capable of simulating natural daylight.

Surveys of people who work in an artificially lit environment, such as department stores or factories where there is no visual contact with the outside, have found only a small number of complaints, often related to the feeling of isolation and being closed in. Thus the effects are psychological rather than physical.

## **ATMOSPHERIC POLLUTION**

We breathe air continuously; on average each adult inhales 37lb of air per day but only consumes 3lb of solid food and 3.5lb of liquid. Concern about atmospheric pollution in England has a long history. A Royal Proclamation by King Edward I in 1306 prohibited artificers from using sea coal in their furnaces on the pain of stringent penalties (the execution of at least one offender has been recorded). In the sixteenth century Queen Elizabeth 'findeth herself greatly grieved and annoyed with the taste and smoke of the sea coals'. In the eighteenth and nineteenth century the Industrial Revolution brought increasing problems of atmospheric pollution from the chimneys of factories and houses in the new industrial towns. Legislation to control pollution at that time was directed mainly at industry. The zeal of the sanitary reformers more than 100 years ago in achieving safe drinking water and proper disposal of sewage was not matched by an attack on the other environmental evil, air pollution, which had effectively turned the atmosphere over the large towns into an air sewer. Over the years the public showed little interest; indeed a major contributor to air pollution – the domestic open coal fire – was and sometimes still is stoutly defended.

A dramatic turning point in attitudes to atmospheric pollution occurred in December 1952. A London 'smog' (the word 'smog' was coined to describe fog filled with smoke) coincided with a steep rise in the number of deaths, and although excess deaths had been noted in other smog episodes, nothing quite as notable had occurred before. The matter received wide media coverage and a curious occurrence made the story even more sensational. A number of prime young cattle at a show in London also succumbed from the effects of pollution. Some cynical observers attributed the swift action that followed as a testament to the British love of animals!

A committee (under the chairmanship of Sir Hugh Beaver) was set up immediately following the episode which examined, in a comprehensive way, pollution arising from the combustion of solid fuels. The Beaver Report identified the importance of pollution from domestic sources which it considered to account for 60% of the total, but this

estimate was later revised to about 80%. The link between pollution and respiratory diseases was emphasized and the economic cost of pollution on property was spelt out. The recommendations formed the basis of the Clean Air Act, 1956.

### **Types of pollutants**

Pure air is almost as uncommon as pure water for in addition to nitrogen, oxygen, water vapour and the inert gases, the air over land and sea is likely to contain many additional substances. Salt particles, ozone, carbon dioxide, ammonia, oxides of sulphur and nitrogen, pollen and other particles from vegetation, as well as the products of organic fermentation are just a few common examples. However, the main concern of those involved in environmental control is with man-made pollutants from the combustion of fossil fuels, in particular bituminous coal and oil. Natural gas causes little pollution but can, of course, be a hazard through the production of carbon monoxide where there is insufficient oxygen to effect complete combustion. Electricity itself is pollution free, but the power stations which generate it also produce 50% of the sulphur dioxide discharged into the atmosphere of Britain.

### *Grit and dust*

Industrial sources often are responsible for grit and dust in the form of fine ash which can be carried some distance by winds. Although this has not been associated with health hazards, it is detrimental to the amenities of the area.

### *Smoke*

Carbon and other chemicals are contained in smoke. Domestic smoke consists of carbonaceous material and tar which makes it sticky so that it adheres to buildings, clothing, vegetation and other material as greasy smuts, whereas factory smoke is carbonaceous matter and ash without tar.

### *Sulphur*

The amount of sulphur compounds discharged into the atmosphere depends on the sulphur content of the fuels being burned.

### *Other pollutants*

Relatively small quantities of other pollutants, such as oxides of nitrogen, fluorides and hydrochloric acid, can also arise, but mainly from industrial processes. Carbon monoxide is the result of incomplete combustion of hydrocarbons; car exhausts, for example, can contain up to 10% of the gas. Diesel engines, on the other hand, use excess air,

and if properly adjusted should give neither carbon monoxide nor smoke. Petrol also contains lead additives which pollute the atmosphere. Chemical reactions can occur in the atmosphere: the oxides of sulphur and water forming sulphuric acid, oxides of nitrogen form nitric acid and the chemical reactions between sulphur dioxide and ammonia result in ammonium sulphate.

### **Atmospheric conditions and pollution**

The level of atmospheric pollution at any one time depends on the prevailing atmospheric conditions as well as the topographical features. Air movement tends to disperse pollutants and usually the air near the ground is warmest and becomes colder with height. Warm air rises and carries with it any pollutants. However, under certain circumstances temperature inversion occurs when rapid cooling of the lower layers of the air results in cold air being trapped under a higher layer of warm air. The cold air containing water vapour and the pollutants from combustion cannot disperse and the result is smog. The main contributor to pollution in large towns is the coal fire, where the smoke is discharged at relatively low temperatures, low levels and at low speeds. Industrial pollution, on the other hand, is discharged from high chimneys at high temperature and high speeds and often is able to penetrate through the warm air ceiling. Under these conditions high pollution levels occur with reactions between the chemicals in the air in the presence of moisture, in particular the conversion of oxides of sulphur to sulphuric acid. Particular topographical features such as towns built in valleys can increase the changes of temperature inversion. A classic case is Los Angeles where the city lies in a basin and has frequent occasions when temperature inversion occurs. There, a different phenomenon occurs: the exhaust gases from a large number of automobiles in the presence of strong sunlight results in a photochemical reaction between the oxides of nitrogen and hydrocarbons to produce ozone and other chemical compounds. This also took place in some British cities during the exceptionally sunny weather of the summer of 1976.

The effect of the reduction of smoke in the atmosphere is to allow the sunshine to penetrate through to the ground and hence reduce the chances of temperature inversion occurring.

Concern has been expressed about the amount of carbon dioxide (CO<sub>2</sub>) discharged into the atmosphere from the combustion of fossil fuels. Carbon dioxide could interfere with the infra-red radiation from the sun trapping it in the Earth's atmosphere and thus raising temperature, which might result in the melting of the polar icecaps. However, it has also been pointed out that an increase in temperature would result in accelerating photosynthesis and hence reduce atmospheric carbon dioxide.

There have also been suggestions that the increase in particulate matter in the atmosphere could form a belt around the Earth which would obstruct sunlight, and hence result in reduction of the Earth's temperature.

### **Legislation**

The Clean Air Act 1956, later amended by the Clean Air Act 1968, and the Control of Pollution Act 1974, makes provisions to inhibit the emission of dark smoke from the chimney of any building except in special circumstances. Dark smoke is defined on a standardized (Ringelmann) chart setting out different shades. It may be permitted for limited periods, for instance when lighting up furnaces from cold, when there is unforeseeable failure of equipment, or if the use of unsuitable fuel is unavoidable. Legislation also encompasses other matters including heights of chimneys and empowers local authorities to carry out investigation, research and education concerning air pollution. It also requires furnaces to be fitted with flue cleaning equipment. The installation of new furnaces and modification of existing furnaces can also be made conditional on prior approval by the local authority.

### **Smoke control areas**

Control of pollution from domestic sources was achieved by smoke control areas, which were first set out nationally under the 1956 Act (some local authorities had existing private acts for this purpose). In general, it is an offence to emit smoke from chimneys, but these are not smokeless zones because controlled amounts of smoke from specific buildings are permitted, for example, as a result of lighting up a furnace. The establishment of smoke control areas was a lengthy procedure, similar to slum clearance. It has recently been greatly simplified and the process accelerated.

Every year central government informs local authorities of the amount of money allocated to them for this purpose during the following year. Special attention is directed towards so-called 'black areas' where smoke control is desirable. A list is issued by central government and local authorities within these are expected to submit a five-year programme of smoke control orders, up-dated each year.

The local authority may then make any smoke control order it wishes within this financial limit, without the need for Central Government approval, provided the average cost per house does not exceed a figure laid down. Any objections to the making of an order must be considered by the local authority.

Owner-occupiers receive grants for conversion equal to 70% of the total cost, which is shared by central and local government. Local

resistance to smoke control areas often occurs in mining communities and there is less enthusiasm in some non-industrial areas.

### **Trends in pollution levels**

Smoke control areas have resulted in a dramatic improvement in the quality of air, but other events have aided the process. The trend towards central heating and the switch to natural gas as a fuel have greatly helped. Evidence of the impact of these indirect measures comes from towns on the South Coast where there are few smoke control areas but a great improvement in the quality of the air has taken place. In Teesside, the main industries in the late 1960s changed to natural gas for economic reasons and this made a great improvement in the quality of the air there. Smoke concentrations nationally have fallen very markedly since 1960 and in large towns the amount of smoke is a fifth or much lower than its previous level. There has been some increase in the emission of sulphur dioxide, but the use of natural gas which is virtually sulphur free has helped to reduce the concentrations of sulphur dioxide at ground level and the reduction of smoke in the atmosphere has aided its dispersal.

### **Monitoring of pollution**

Measurements of smoke and sulphur dioxide are carried out by local authorities on a daily basis in over 1000 sites in Britain. The results are collated and published nationally by a central government agency.

#### *Measuring smoke pollution*

Comparison between the amount of light reflected by the staining on a white filter paper after air has been drawn through it and the amount reflected from a clean piece gives an index of smoke pollution. From such readings smoke concentration is estimated and expressed in microgrammes per cubic metre of air ( $\mu\text{g}/\text{m}^3$ ) as an average level over a period of time.

#### *Measuring sulphur pollution*

For estimating sulphur dioxide in the atmosphere, a measured quantity of air is passed through dilute hydrogen peroxide solution which oxidizes sulphur dioxide to sulphuric acid. Subsequent titration with alkali allows the concentration of sulphur dioxide in the air to be calculated. Sulphur dioxide measurements may be carried out daily, but more advanced equipment available at a few centres permits continuous readings to be made.

#### *Grit and dust measurements*

Deposit gauges collect grit, dust and other solids which are then



analysed monthly. This information gives an indication of industrial pollution, which is of less importance to health but is of value in monitoring the amenities of a locality.

Most of the work in connection with clean air is carried out by local authorities. The exceptions are a small number of specified, specialized industries where there are difficult technical problems. These come under the jurisdiction of a small group of specialized inspectors from amongst the staff of the Health and Safety Executive. The inspectors are known as 'alkali' inspectors, because they were set up under the Alkali Works Act 1863 to deal with difficult pollution problems. They collaborate with the environmental health officers, although there are periodic complaints from local authorities who are restricted in pursuing troublesome problems that are under the control of the alkali inspectorate.

### **The effect of atmospheric pollution on health**

Precise estimates of the risk of atmospheric pollution to health are difficult to determine because of problems in estimating the degree of exposure of individuals and the influence of possible confounding variables such as cigarette smoking, nutrition, occupation, and climate.

The exact way in which pollutants in the atmosphere affect the lungs is not completely clear. Experimental work in both Man and animals using sulphur dioxide and other pollutants has produced results that are somewhat inconclusive. The pollutants in smog may influence the growth of certain bacteria and there is evidence that a change occurs in the bacteria in sputum following exposure to fog. It has also been suggested that the effects of sulphur dioxide are enhanced by the presence of other pollutants (synergism). Many experts regard the oxides of sulphur as the most potent cause of symptoms from pollution, although the precise mechanism is ill-understood. It may be that pollutants act as irritants, vasoconstrictors or stimulators of hypersecretion of mucus in the lungs and bronchi.

### ***Acute effects***

There is wide agreement that patients with well-established respiratory or cardiac disease, particularly the elderly, suffer adverse effects of atmospheric pollution when it reaches peak levels. This was amply demonstrated during the London fog of December 1952 and since then studies on daily mortality and on hospital admissions via the emergency bed service in London have been monitored. In periods of major fog the death rate and hospital admission rate increased until the winter 1962/63. Since then this relationship has not reappeared, and

the fogs that have occurred have held much less pollution from smoke and sulphur dioxide.

Studies with patients who keep a daily diary of their symptoms suggest that deterioration in symptoms occurs at smoke levels up to  $250 \mu\text{g}/\text{m}^3$  and with sulphur dioxide levels over  $500 \mu\text{g}/\text{m}^3$ . However, a study in Teesside with a small sample of 73 chronic bronchitic patients using a similar diary method showed that they were affected at much lower levels of  $150 \mu\text{g}/\text{m}^3$  of smoke and sulphur dioxide. Thus those who had diseased lungs were adversely affected by relatively moderate rises in levels of pollution<sup>2</sup>.

### *Long-term effects*

Population studies provide the main source of information about the long-term effects of atmospheric pollution, but unfortunately many of these have proved difficult to interpret. Of the diseases said to be associated with atmospheric pollution, the two most commonly mentioned are chronic bronchitis and lung cancer.

*Chronic bronchitis.* This has been referred to as the 'Englishman's disease' and accounted for 6% of all deaths in England and Wales in the early 1970s. This was approximately four times higher than most industrial regions in Western Europe. However, there has been a sharp decline in deaths from this cause since 1968 for both men and women (a decline of 31% between 1968 and 1976 occurred, independent of age structure of the population). The disease is more than twice as common in men than women, shows a steep gradient from Social Class I to Social Class V, is more common in smokers, and usually occurs in people over the age of 50 years. In Britain, it is usually less frequent in rural than urban industrial areas. Studies of sickness rates due to chronic bronchitis in civil servants and postmen revealed links with exposure to atmospheric pollution. A survey was carried out in Teesside in the 1970s which compared the health of 7-year-olds living in high- and low-pollution areas and broadly confirmed earlier studies in Sheffield, in showing a higher proportion of lower respiratory tract infections in areas of high air pollution<sup>2</sup>. However, there are other factors implicated in the causation. In adults a particular problem is cigarette smoking. Not all cigarette smokers get chronic bronchitis, so there is probably some individual predisposition involved. Also linked with chronic bronchitis is occupation, social class, standard of housing and nutrition, as well as climatic conditions. It is thought unlikely that atmospheric pollution causes chronic bronchitis, but it does exacerbate symptoms in the established disease.

Table 10.2 shows the improvement in age-specific death rates from bronchitis in Greater London. This, of course, may be explained by other reasons such as less fit people moving out of London and fitter people moving in or changes in smoking habits, but it equally could be the change in urban disadvantage for bronchitis.

*Lung Cancer.* Statements are often made that atmospheric pollution is the cause of lung cancer. Certainly lung cancer rates are higher in urban than in rural areas. It is also true that smoke from coal contains well-known carcinogens. However, over a period when coal smoke has been subsequently reduced, lung cancer rates have continued to increase. Furthermore, in some European countries where there is little pollution in urban areas, there is still a marked rural-urban gradient for lung cancer. This has given rise to the hypothesis that there is an 'urban factor' which is a combination of adverse features. Most studies carried out during the last 20 years point to the prime cause of lung cancer as cigarette smoking and the part played by atmospheric pollution is probably quite small (see Chapter 2).

#### *Pollution from motor vehicles*

This subject has also received considerable attention. Its part in the production of the photochemical smog in Los Angeles is well documented. Carbon monoxide, which is produced by the petrol but not the diesel engine, has also been closely studied and its content in the air has also been monitored. However, although levels can build up in busy streets, cars produce their own turbulence and carbon monoxide is usually quickly dispersed and diluted. Studies on occupational groups

**Table 10.2** Bronchitis: age-specific death rates, males aged 60 to 64 years, Greater London and Rural Districts of England and Wales

<i>Year of death</i>	<i>Approx. year of birth</i>	<i>Deaths per 100 000</i>	
		<i>Greater London</i>	<i>Rural Districts</i>
1946-50	1886	290	140
1951-55	1891	310	150
1956-60	1896	280	155
1961-65	1901	255	175
1966-70	1906	215	175
1973	1911	160	135

Source: Waller, R. E. (1978). Control of air pollution: present success and future prospect. In Bennett, A. E. (ed.) *Recent Advances in Community Medicine*, Chapter 4. (Edinburgh: Churchill Livingstone)

that are regularly in contact with traffic have shown carboxyhaemoglobin levels well below the 8–10% levels found frequently in cigarette smokers. It is important that these studies should continue, but so far no clear risks of health have emerged.

Lead from petrol exhausts has also been measured in the atmosphere and is found in quantities well below the levels permitted in industry. Exhaust gas from petrol engines is the largest source of atmospheric lead, which may be as high as  $20 \mu\text{g}/\text{m}^3$  in road tunnels and at road junctions. There is a national programme aimed at the gradual reduction of lead in petrol. Lead is a particularly dangerous heavy metal, especially in children (possibly inducing cerebral impairment) where the lead, which is in an organic form (tetraethyl Pb) is not well excreted. As a cumulative poison lead is dangerous because it is also present in food, water and some utensils.

## **HOUSING**

Living accommodation is designed to provide shelter, security and comfort. Whether it be in the form of a house, a flat, a bed-sitting room, a caravan, a houseboat, or a residential institution, all are covered by legislation.

The Industrial Revolution led to small houses and large tenements crowding the centres of the new towns and cities in narrow streets with little open space. Those dwellings were poorly ventilated, ill-lit, lacking in sanitary facilities and the practice of burning coal on open fires created a smoke-polluted environment.

The Victorian public health reformers had, as one of their central tenets, the improvement of housing as a means to achieving health. The prevailing theories of disease causation implicated noxious gases arising from filth and dirt, and hence were the rationale for sanitary legislation embodying regulations about ventilation of rooms, segregation of the sexes, structure of floors, staircases, heights of rooms and water supply. It must be recognized that it was the provision of sanitary facilities which brought the major improvement in health during that period.

The medical approach to housing is still dominant today, with the concept of 'fitness for human habitation' reflecting the continuation of a health orientation which centres on the physical state of individual houses.

More recently, however, there has been greater recognition of the importance of broader social approach so that housing is not considered on its own, but as part of a total environment which includes amenities such as shops, utilities, schools, open spaces, parks and ambient air of good quality.

**Maintaining housing standards**

The standard of housing in Britain compares favourably with that of other industrialized countries, and this is partly due to the relatively large proportion of public ownership. In spite of this about 1½ million families live in dwellings which are either unfit for habitation, according to present standards, or lack at least one basic amenity (inside WC, hot water supply to fixed bath and sink).

Under various Acts of Parliament, local authorities in Britain have an obligation to remedy unsatisfactory housing, and undertake inspections to identify what action is necessary to meet this responsibility. Most authorized inspecting officers are environmental health officers.

Under housing legislation, criteria are laid down for what renders a house unfit for human habitation. Included are state of repair, stability, freedom from damp, internal arrangements, natural lighting, ventilation, water supply, drainage, sanitary conveniences, as well as facilities for the preparation and cooking of food. If the house is deemed to be unfit then there are a number of courses of action open to the local authority.

***Individual unit houses***

If the house can be repaired at a reasonable cost, a notice is served upon the person in control of the house specifying the work required and setting a time limit. In the case of default, the local authority is empowered to carry out the repairs and recover the cost. If it is considered that the house is not repairable at reasonable costs, the owner is still given the opportunity of making the necessary repairs to bring it up to standard. Otherwise the house is demolished or closed. The procedure for this is laid down precisely, but depends on adjoining property. There are rights of appeal.

***Clearance areas***

If a number of unfit houses exist in the same locality, the local authority can define a clearance area. Houses included in such clearance areas are either unfit for human habitation or badly arranged with narrow streets. If authorities are unable to purchase property by agreement, then powers exist for compulsory purchase. There is a statutory procedure for dealing with a clearance area before demolition takes place. This includes inspection of the property, advising all interested parties, a public inquiry and (after confirmation of the order by the Minister) rehousing of the occupants.

The 'golden age' of slum clearance was from 1930 to the outbreak of World War II (under the Housing Acts of 1930 and 1936). The movement was suspended during the war but from shortly after the end of

the war until the mid-1970s the creation of clearance areas was the method used to remove slums, particularly from the centres of the big towns and cities. The vacant land tended to be used not for rehousing, but for commercial and other developments. Rehousing most often took place in estates on the outskirts of towns. The outcome has been generally viewed unfavourably, because it has left many towns and cities denuded of residents in their central areas.

### *House improvement*

The emphasis over the last few years has switched from clearance to improvement of existing houses, either individually or in areas. A variety of grants are available for individual house improvements. The local authority can designate an area as a Housing Action Area or as a General Improvement Area. Such areas have houses which, though generally unsatisfactory, are capable of being improved. Land is bought either by agreement or compulsorily. Improvements are carried out on the property directly as well as assisting owners and tenants by giving grants for repairs. In Housing Action Areas this is usually done within 5 years; in Improvement Areas there is no time limit and the grounds for assistance are less generous. The declaration of priority zones is designed to prevent deterioration in and around stress areas. Procedures adopted are similar to those used for Housing Action Areas. Compulsory improvement of homes in Improvement or Action Areas is occasionally necessary, but the whole tenor of advice from central to local government is to use persuasion and encouragement rather than compulsion.

### *Miscellaneous living accommodation*

Caravans, tents, vans, sheds or other similar structures used for human habitation are subject to Acts and By-laws which authorize local authorities to control standards as if they were permanent buildings used for human habitation. The legislation deals with such matters as water supply, sanitary conditions and the prevention of the spread of disease.

### **Rehousing on medical grounds**

Virtually all housing authorities take account of medical problems, if present, when considering an application for housing. Many operate a points system to which certain priority factors contribute: time on the waiting list, family size, lack of amenities, overcrowding and poor social circumstances are examples. When the required number of points are achieved the family is rehoused. Most authorities allow points for medical problems. Applicants are well aware of this and it is estimated that some 40% produce evidence in the form of a medical

certificate from their general practitioner. Housing Departments usually liaise with health authority staff to analyse and process this information. After rejecting the more frivolous applications a number are then visited usually by a health visitor, but sometimes by an environmental health officer or an occupational therapist. The community physician then assesses the information and may contact the general practitioner or (if appropriate) a hospital consultant and allocate points if, in his judgement, this is warranted. In fact the number of points given on medical grounds reduces waiting time for accommodation by a relatively small amount, although most authorities allow outright medical priority for exceptional and very urgent medical need (such as a severely handicapped child being cared for in a household with no inside toilet). A small proportion of authorities do not operate a points system for medical priorities and instead consider advice from the community physician. There is no standard method and little published information on how the assessment is made for medical priority. It is probably that the judgement varies with different community physicians.

Muir Gray described an approach in Oxford which used a classification reflecting the effect of housing on physical disease, mental illness and handicap<sup>3</sup>. Of 612 applicants, none was classified as 'housing conditions definitely causing physical disease', but 76 were categorized as 'housing conditions possibly causing physical disease' and 138 'housing conditions possibly causing mental disease' and 222 classified as no disease or infirmity but 'housing conditions affecting social wellbeing'. The remaining cases had housing which was unsuitable or difficult because of the effects of physical disease or infirmity. However, only 5% of all applicants for rehousing on medical grounds were ultimately successful (most of them given outright priority as urgent cases). In an assessment 6 months after being rehoused because of possible mental illness, 10 out of 12 households showed some improvement and in five of these cases the general practitioner had been unable to reduce the amount of psychotropic drugs prescribed.

Another published scheme for dealing with medical priorities for rehousing is more restrictive and concentrates mainly on housing design as a mobility aid and suggests that the skills required for assessment more appropriately lie with occupational therapists. Thus, if an individual is restricted in activities because of inability to negotiate steps or stairs then appropriately designed housing could overcome this problem. In this approach overcrowding, dampness, complaints about noise and adequate heating and lack of amenities are seen as technical matters for consideration by the environmental health department. Neurosis and depression are only exceptionally regarded as reasons for

rehousing. However, it would be misleading to suggest that a standard system exists to deal with this complex problem. A community physician, writing recently about medical priorities for housing, complained of the difficulty of adhering to a standard assessment regime in the face of pressure from Councillors and MPs, especially just before an election. One of the other inconsistencies reported was the fact that applications (supported by medical certificates) from sufferers with chest disease seeking a move to centrally heated accommodation was equalled by the number requesting transfer from centrally heated housing to somewhere with a coal fire.

It is clear that the situation at present is not satisfactory and there seems to be an obvious need for some rationalization of procedure and for more attention to be paid to the scientific evidence of the effects of housing on health.

### **Housing and health**

For well over 100 years it has been generally acknowledged that housing has an important role in health, although the precise way in which this relationship is manifest is difficult to determine. What is not certain is whether poor housing *per se* is the cause of poor health and how important is the influence of housing conditions on health. Two groups in the population spend the most time in the home, mothers and their young children and the elderly, who are therefore frequently highlighted in studies.

### **Physical health**

Strong associations have often been found between poor housing and poor health, and good housing and good health. Various studies have shown that rates of respiratory tract and other diseases are up to twice as high for children in poor housing compared to those in good housing. Overcrowding particularly seems to be associated with high rates of respiratory infection and high frequencies of home accidents. There is no good evidence that dampness in houses actually causes respiratory diseases or rheumatic complaints, but once these conditions have developed such houses would clearly be unsuitable environments.

### **Hypothermia**

Virtually all cases of hypothermia in elderly people and babies occur at home. Poorly insulated and inadequately heated houses result in low environmental temperature, but these are often associated with low incomes and a desire to economize on fuel (this subject is discussed further in Chapter 8).



*Home accidents*

Burns and scalds in children occur more frequently in poor housing conditions where, for example, a kettle is the usual method of heating water. Some workers have found that parental supervision is the paramount factor. A substantial proportion of accidents occur in modern houses because of faulty design: the absence of safety glass in doors, hazards with balconies and roofs, stairs and banisters. Many home accidents amongst elderly people are associated with falls as a result of design hazards as well as poor lighting.

*Moving house*

It is well known that a family moving into better housing accommodation does not necessarily become healthier. Work by McGonigle, a Medical Officer of Health in Stockton-on-Tees in the 1930s, showed that families who had been moved to a new housing estate had a poorer health record than those that had remained in the slum area. This was partly explained by an increase in family expenditure on higher rents, fares to work and other costs which helped to lower the nutritional status of the individuals concerned. Studies of people living in new housing estates and new towns have shown an increase in mental illness and emotional disturbances. This shows itself in higher consultation rates with general practitioners and higher admission rates to hospital. This is usually interpreted as a by-product of the break-up of traditional communities and the severing or weakening of links with families and friends.

*Flats*

It has been suggested that the health of people in high-rise flats is affected adversely, for example leading to an increase of psychoneurotic disorders in women, because of social isolation. However, the findings of studies of the detrimental effects of high-rise dwellings are contradictory.

*Psychological conditions*

It is often held that good housing is essential to good mental health. Families living in poor housing are likely to lack space for children to play and study, and in overcrowded conditions with excessive noise conflict in the family may arise. Psychological damage as a direct effect of such stressful environments is difficult to confirm by research findings. Delinquency and crime rates have often been attributed to overcrowding and poor housing, but many would say that the causes are much more complex. The 'breeder' and 'drift' hypotheses on alternative interpretations in the aetiology of schizophrenia (described in Chapter 7) illustrate well the need for great caution for concluding

that housing is causally related to mental or, indeed, physical illness.

### **Limitations of housing and health studies**

There is ample evidence that poor housing and poor health are strongly related, but this ignores other features of poverty. The reader has already been warned of the problems of interpreting ecological correlations as cause and effect (see Chapter 3). An example of a pitfall for the unwary arises from the generally unpublicized tendency for housing authorities to place families with problems in inferior low-rental property. Thus, poor and disadvantaged families, frequently with a selection of health problems, find themselves in low-standard dwellings as a result of housing policy.

In this complex situation there are major difficulties in designing research to demonstrate unequivocally a causal relationship between ill-health and housing. More recent work with more satisfactory study designs seems to demonstrate that the influence of housing as a physical environment is not very important in relation to health. The provision of facilities in themselves is not sufficient if people do not know how to make proper and full use of them.

An illustration of erroneous conclusions about the relationship of housing and health derived from research concerns tuberculosis, which for years has been closely associated with poor housing. Many studies show a high incidence in localities with poor housing as compared with localities with better housing, and the false inference is often then made that the quality of housing affects the spread of the disease. Tuberculosis can indeed spread to the other members of a household if one of its members acquires the infection. The proper approach to investigating the transmission of tuberculosis and its relationship to the quality of housing would be to consider a range of types of properties who have a member with the disease, and to examine subsequent infections in other members. The few studies which have taken this approach have shown that there is only a marginal excess of secondary cases in slum properties compared to good quality housing.

### **RADIATION**

Radiation as a form of energy transfer can take place in two ways: by waves or by particles. Only ionizing radiation is considered here. Non-ionizing radiation has low frequency waves (infra-red, radio, and microwaves are examples) and has different biological effects, mostly arising directly or indirectly from overheating of tissues. Ultraviolet light is the part of the spectrum which covers the transition point between ionizing and non-ionizing radiation. Of the potentially

dangerous physical and chemical agents in the environment none has been so intensively researched as radiation exposure. Yet there are still uncertainties, particularly in relation to the effects of low dosage.

### **Measuring radiation**

In order to understand the effects of radiation it is necessary to be familiar with the standard units of measurement. Radiation loses energy on entering tissue and the atoms of the tissue may become charged (ionized). Ionizing radiation is energy consisting of particles moving at very high speeds or waves which arise either naturally from the nuclei of unstable atoms or from man-made sources. The different types of radiation are alpha, beta and neutron particles, gamma rays and X-rays. They vary in their ability to penetrate and ionize, and hence to alter, the molecular structure of the exposed tissue. Alpha particles are more densely ionizing and therefore lose their energy before they can penetrate deeply into tissues. They are referred to as high linear-energy-transfer (high-LET) radiation. Neutrons themselves are non-ionizing, but produce ionization by transferring their energy to electrons. The LET radiation from neutrons varies critically with its initial energy. Beta particles, gamma and X-rays are more penetrating and are classified as low-LET radiation. High-LET radiation causes extensive damage to cells, but alpha particles can hardly penetrate the superficial layers of the skin. They are hazardous, however, if the source from which they are emitted was taken into the body, for example by inhalation or ingestion. Low-LET radiation affects fewer cells and these can often recover or be replaced by the body's natural repair process. Gamma rays and X-rays can pass through the body and affect internal organs. Beta particles may penetrate to a depth of about one centimetre and so affect superficial tissues.

The absorbed dose is the quantity used to express the energy density absorbed by living tissue and its unit is the gray (Gy), named after a British scientist, which is equivalent to 1 joule per kilogram. Since there is a variation in the biological effect of high-LET and low-LET, this is allowed for in the quantity known as the dose equivalent, for which the unit is the sievert (Sv), named after a Swedish scientist, by introducing a quality factor (QF) for the type of radiation.

$$\text{Dose equivalent} = \text{absorbed dose} \times \text{quality factor}$$

Hence, one gray for the more densely ionizing alpha particles is equivalent to 20 sieverts, whilst 1 gray for the low-LET beta particles and gamma and X-rays is equivalent to 1 sievert. As environmental radiation is at very low level it is customary to express dosage in millisieverts (mSv). One sievert is thus equal to 1000 mSv. The collective dose in person-sieverts is a means of expressing exposure in terms of

population rather than individuals. One hundred people exposed to 30 mSv each would be counted as 3 person-sieverts, 50 people exposed to 20 mSv would be 1 person-sievert, and so on.

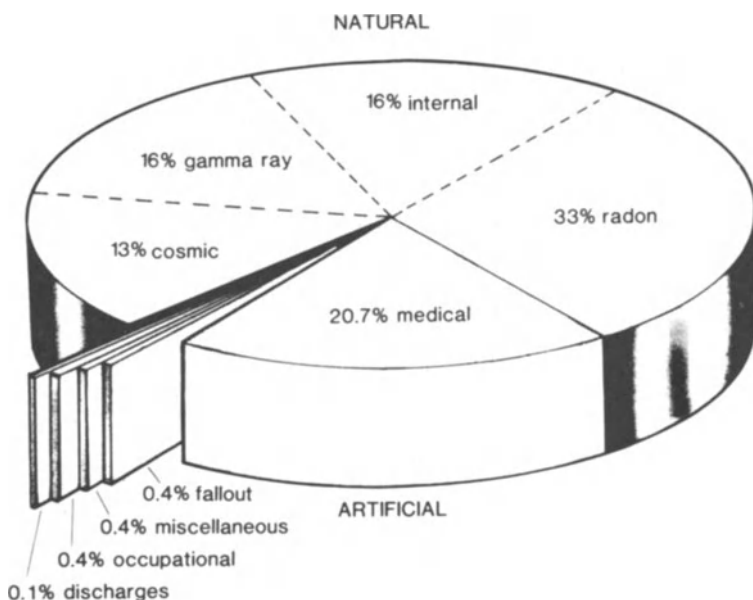
#### *Amount of radiation exposure*

Système international d'unités (SI units) is a system of metric units now widely used in science and medicine and is especially useful in making international comparisons. Some papers may still refer to the older units, the radiation absorbed dose (rad) and the roentgen equivalent for man (rem). One Gy is equivalent to 100 rads and one Sv is equivalent to 100 rems. The average annual whole-body equivalent in the UK is about 1.6 mSv from all sources. The natural background radiation is on average 1 mSv per year. Medical radiation accounts for about 0.5 mSv per year. The recommended maximum exposure for individuals in the general population is 5 mSv per year, but it is expected that the average would not exceed 1 mSv per year exclusive of natural background and medical exposure.

#### **Sources of radiation**

The radiation exposure of the population of the United Kingdom comes from two main sources: natural background radiation and medical sources. This is shown diagrammatically on Figure 10.2, but it refers to averages from the whole population so some individuals or sections of the population will have higher exposures. About two-thirds of background radiation comes from rocks, soil and cosmic rays. About one-fifth comes from medical radiation and less than 1% from mixed man-made sources such as consumer products, fall-out and occupational exposure. Radiation is higher from the older rocks, such as granite, than from the newer sedimentary deposits such as limestone. Thus, the natural background radiation in a place like Aberdeen, with its large amount of granite, is about twice the average. Some naturally radioactive material is taken up in food crops and dissolved in drinking water. Cosmic rays are attenuated by the Earth's atmosphere but are more intense at higher altitudes. Air travel gives very slightly increased exposure. Radon decay products enter the atmosphere from the ground and are rapidly dispersed, but in houses the concentration may build up especially if ventilation is poor. They attach themselves to dust particles and when inhaled irradiate the lungs. The importance of this has been recently recognized and the subject is being studied in a number of countries including Britain, where the desire to conserve energy often entails reducing ventilation.

The largest source of artificial radiation is from medical equipment. A great improvement has been made in the equipment and techniques, but there is still room for further reduction. Fall-out from atmospheric



**Figure 10.2** Sources of radiation to which the population of the UK are exposed. Source: *Living with Radiation*. (1981). (The National Radiological Protection Board)

nuclear test explosions used to be a major contaminant of the environment, but this is now greatly diminished. The old-fashioned luminous watch emitted intense gamma radiation, but new luminous watches use tritium with such low beta energy that they are virtually free of external radiation. Other consumer products which emit radiation are dealt with under a voluntary scheme that is soon to become mandatory. It is estimated that nuclear power accounts for about 0.15% of the collective radiation exposure in the UK.

### Monitoring bodies

Public concern about radiation hazards was reflected in the setting up of the International Commission on Radiological Protection in the 1920s and other similar bodies were established on national lines. The International Commission on Radiological Protection recommends maximum radiation dose limits for different circumstances. In Britain the National Radiological Protection Board has a duty to advise the Government on the protection of the population from hazards of radiation, and works closely with other international bodies.

**Effects of radiation on health**

Soon after Wilhelm Roentgen introduced diagnostic X-rays in 1895, their damaging effects were noticed. Prolonged exposure of human skin caused ulceration and cancerous changes, and small animals like mice succumbed to large doses of X-rays. Awareness of the hazards were heightened when Marie Curie and some of her colleagues working on radiation developed leukaemia. There was further concern when it was demonstrated that radiation exposure produced genetic changes in insects.

Radiation can affect the tissues in three ways. If the dose is high enough it kills cells, and at lower doses it can have long-term effects in producing cancer and also genetic changes, though the latter have not been demonstrated in man.

Most of the evidence of the effect of radiation on humans comes from studies on people who have been subjected to high and medium doses. The populations studied include the Japanese survivors of the atomic bombs, people who have been exposed to radiation for medical purposes, and various occupational groups. Studies on populations living in high background radiation areas have been inconclusive. The main discussion centres around how to extrapolate the data concerning those exposed to high and medium doses so that the risk may be postulated for low doses and low dose rate exposure.

***Japanese data***

Data on the Japanese atom bomb survivors are detailed and extensive. About a quarter-of-a-million people have been under surveillance for about 30 years. There has been an excess number of cases of leukaemia, with a mean latency period of about 10 years, and an excess of other malignant tumours with latencies of 20 years and upwards. Pregnant women at the time of the explosion and who were survivors had a greater than expected number of microcephalic and mentally handicapped children. There was no excess of childhood cancers or genetic defects in the children of exposed women who conceived after the explosion.

***Iatrogenic cases***

Groups that have had considerable amounts of irradiation for therapeutic purposes at a time when the adverse effects of radiation were not fully appreciated have shown an increased risk of developing cancer. This is broadly similar to the calculated risk from the Japanese data, after making allowances for the different dosage.

For example, patients treated for ankylosing spondylitis and children treated for ringworm of the scalp have shown an increased rate of leukaemia and other cancers. Women who had tuberculosis

with pneumothorax and were repeatedly chest X-rayed and those who have been treated with radiotherapy for mastitis have had a greater than expected occurrence of breast cancer.

### **Safety and risk**

Opinion is considerably divided over estimates of radiation risk.

There are three areas of contention. Firstly, some authorities hold that natural background radiation can be regarded as a safe level, whilst others believe that there is no threshold dose for radiation, any amount, no matter how small, being potentially dangerous. Secondly, there is criticism of the methodology of the 'key' studies which have established estimates of risk. For example, one in particular concerning a plutonium processing plant in the USA suggested that there was a 10–20 times higher risk of cancer amongst workers who had been exposed to radiation. This study later came under strong attack because of the statistical methods used and the type of cancer included.

Thirdly, and most importantly, is the issue of how the risk of health should be estimated for low doses of radiation. There are serious problems in assessing the importance of a carcinogenic agent like radiation, which in small doses may produce a few cases of cancer in a variety of organs, when there are likely to be more powerful carcinogens in the environment.

Thus, most of the predictions of risk are based on extrapolation from high doses of radiation. There is no doubt that high doses of radiation are harmful and the results can be predicted. If the relationship between death rate and exposure at high-dose levels (which is generally accepted as one death per 100 people per sievert of lifetime exposure) remains true of low levels of exposure, then if a million persons were exposed to one millisievert above natural background radiation during their lifetime, 10 extra cancer deaths would result. The difficulty of investigating the problem is apparent when it is realized that in the same population approximately 20 000 deaths would have occurred in any event. However, it must be pointed out that not everyone agrees that a direct relationship exists and several other suggested methods of calculating risk have been made. Table 10.3 shows the principal harmful radiation effects.

### ***Nuclear power***

The perceived risks of the development of nuclear power have aroused strong emotions in members of the public. The accident at the Three Mile Island power station in Pennsylvania, USA in 1979 served to heighten this concern. Although the amount of radioactivity released was relatively small, there still remains the concern that a greater catastrophe might have resulted. In Britain, the record of nuclear power

**Table 10.3 Principal harmful radiation effects: conditions for occurrence and sources of information**

<i>Effect</i>	<i>Condition</i>	<i>Information</i>
<i>Early</i>	Very high dose and dose rate:	} Human data from various sources
Death	to much of body	
Erythema	to area of skin	
Sterility	to testes and ovaries	
<i>Late</i>	Any dose or dose rate.	Risk data for humans by linear extrapolation from high doses and dose rates. Various sensitivities of organs
Malignant diseases	Probability depends on dose. Manifested years later.	
Hereditary defects	Any dose or dose rate. Probability depends on dose. Manifested in descendants.	Risk data for humans by inference from mouse data. Upper limit from human data
Non-malignant changes	Very high dose. Various times to manifestation.	Human data from various sources
Developmental changes	Irradiation of embryo. Manifested after birth.	Limited human data

Source: *Living with Radiation*. (1981). (The National Radiological Protection Board)

has been exceptionally good, though there have been a number of leaks of contaminated water from the Windscale plant in Cumbria. Nuclear power stations, as do other industries, carry a risk though, at the moment, it is considered to be no greater than that of the conventional method of producing power. However, environmentalists emphasize that if proper conservation of energy were carried out in Britain the need for nuclear power would vanish.

### *Fish*

There has been some concern about the contamination of fish (including shellfish) through discharge of low-level radiation waste into the sea. Recent extensive testing has given the reassuring results



that even someone living on a diet solely of fish is unlikely to reach the limit of 5 mSv a year.

### *Genetic effects*

The special risk that applies with radiation is the possibility of long-term genetic effects and the risk of contaminating the environment with long half-life radioactive materials that could affect future generations. However, genetic effects of radiation have not been demonstrated in humans, possibly because man-made sources are of recent origin. There is, nevertheless, evidence from animal experiments, and therefore it is a subject for serious concern.

## **PEST CONTROL**

Control of pests is an important part of the work of local authorities' environmental health departments. Many allocate the duties to a particular environmental health officer who specializes in the subject and is supported by technical assistants. They work in collaboration with owners and occupiers of premises. Only the common rodents and insect pests are described here.

### **Rats and mice**

The rat most frequently encountered in Britain is the brown rat (*Rattus norvegicus*), sometimes called the water or sewer rat. It is larger than its less common counterpart, the black rat (*Rattus rattus*), which is well known for its historical association with bubonic plague. Rats spoil animal and human foodstuffs and can spread disease. A female rat can have over 100 surviving offspring each year. Although they present a less serious problem, mice too can have a destructive effect on food and spread gastrointestinal disease.

The main preventive strategy involves measures to eliminate opportunities for rats and mice to gain access to foodstuff and waste food, hence the need for strict cleanliness. Buildings can be made rodent proof by sealing potential points of entry. Rat and mouse populations may be further controlled by poisoning and trapping, although the latter is of limited value for mice. The main weapon is poisoning. Acute poisons are reserved for special circumstances, such as sewers and ships. Arsenic and zinc phosphide were commonly used in the past and gassing with cyanide is sometimes employed, but special precautions must be taken because of the serious risk to humans. Nowadays the usual practice is to deploy the slower acting poisons such as warfarin (an anti-coagulant, used therapeutically in man, which causes death in rodents by inducing internal and external bleeding), and  $\alpha$ -chloralose. All ships are required to carry official 'De-ratting'

Certificates which are valid for 6 months, and are issued at specific ports. The process, which ensures that the vessels are rodent-free, involves the use of hydrogen cyanide.

### **Insects**

The common house fly (*Musca domestica*) and other flies like the bluebottle feed on human and animal excreta, as well as on food. Thus they can transfer pathogenic organisms to food, either mechanically on their feet, via their faeces or by regurgitation as part of the feeding process. The female lays over 100 eggs (usually in batches of five or six) in decaying organic matter, such as pieces of meat or fish. Within 48 hours, depending on the temperature, the eggs hatch into maggots which then feed on the food before changing into pupae from which a fully grown fly emerges after a period of as little as a week (longer in cold weather). Flies are most effectively controlled by observing strict rules of cleanliness, adequate disposal of waste, food and other matter. A variety of effective insecticides are now available; benzene hexachloride and malathion are examples and are delivered by spray gun or aerosol container. Other insects such as cockroaches and beetles are of public health importance and are controlled by the use of insecticides and fumigation. The paramount importance of prevention in controlling all these pests cannot be overemphasized.

### **Area treatment**

Considerable success has been reported as a result of systematic treatment of a defined area for the eradication of all pests. When almost total eradication of pests has been achieved it then becomes much easier to maintain a non-pest environment.

## **ENVIRONMENTAL HEALTH OFFICERS**

Before 1974 all local authorities except county councils had a statutory duty to appoint public health inspectors. Since then, the Local Government Act 1972 requires local authorities 'to appoint such officers as they think necessary for the proper discharge of their function'.

Environmental health functions are the responsibility of district councils who have, in nearly all cases, appointed chief environmental health officers to be their 'proper officers' for such purposes. The Medical Officer for Environmental Health employed by the health authority is proper officer for infectious disease control.

Originally 'sanitary inspectors' they became 'public health inspectors' in 1956 and although this is still the statutory title, most local authorities now use the designation 'environmental health officer'

(EHO), which more correctly reflects their wide range of responsibilities.

### **Work of environmental health officers**

Their work includes: the control of atmospheric pollution, infectious diseases, pests, and noise; dealing with aspects of housing such as overcrowding, caravan sites, multi-occupation, slum clearance and improvement; meat inspection; food hygiene and the control of imported foods; control of hygiene at places of entertainment such as camping sites, swimming pools, restaurants and hotels, refuse collection and general public health work in relation to nuisances. Like other health professionals, the environmental health officer is a health educator. Because of the wide range in duties, it is common for local authorities to have EHOs specializing in particular aspects of work, for example, in meat inspection and in pollution control.

### **Training**

The Environmental Health Officers Education Board sets out the syllabus and holds examinations for the Diploma in Environmental Health, the recognized qualification.

The minimum entrance requirements are five passes at O-level and two at A-level of the General Certificate of Education. Training consists of both theoretical instruction and practical training, either as a 4-year course with day-release or a 3-year sandwich course. The academic part, which deals with the theoretical basis of environmental health, is provided at various universities, polytechnics and technical colleges. The trainee is required to undergo practical training under supervision in all aspects of the work of an environmental health officer and must produce evidence of having completed both the academic and practical training before sitting the examination.

Additional qualifications are obtainable by examination in food hygiene and in air pollution control awarded by the Royal Society of Health.

## **PORT HEALTH**

Port health authorities may be either sea port or air port and may cover the area of one local authority district or consist of two or more riparian (on a river estuary) authorities. The medical advice is provided by staff of the corresponding district health authority. The main duties of port health authorities are to prevent the entry of communicable diseases into the country and to carry out inspection of imported food. In addition, they have responsibilities to inspect ships from the point of view of hygiene and rodent infestation. In the past, the prevention of

the entry of the black rat through British sea ports resulted in the eradication of bubonic plague. Today, the danger of rodent importation has again been emphasized, because of Lassa fever. A proportion of rats caught on board ship is still submitted for post-mortem examination on a regular basis, to inspect for signs of plague. If an unusual rodent is caught this must also be examined, because of the risk of importing the rodent *Mastomys natalensis*, the reservoir for Lassa fever in West Africa (see Chapter 9). Strict controls also exist concerning importation and quarantine of certain animals. Their purpose is to prevent the importation of infectious conditions such as rabies or foot and mouth disease.

### **MONITORING OF POLLUTION BY CENTRAL GOVERNMENT**

The Central Unit of Environmental Pollution within the Department of the Environment was established in 1969 and co-ordinates all government work on environmental pollution. It works in co-operation with other bodies in Britain and overseas and is the national monitoring agency for all forms of pollution. It has produced a variety of reports on such subjects as the hazard of lead, mercury and pesticides. As well as reacting to urgent situations, a long-term aim is to build up detailed knowledge of a wide variety of pollutants. The Unit has responsibility for the development of monitoring functions, but at present many of these are on an *ad hoc* basis.

### **INTERNATIONAL HEALTH**

The World Health Organization (WHO) administers international health regulations which aim to minimize the international spread of disease. These regulations, which are amended from time to time, essentially rely on good co-operation between the WHO and individual countries in relation to notification of particular diseases and other information about control measures. Four diseases – plague, cholera, yellow fever and smallpox – are especially dealt with in this way and are hence referred to as ‘diseases subject to the regulations’. International regulations are also concerned with De-ratting Certificates for ships and the disinsectization of aircraft coming from or touching down in yellow fever areas so that the mosquito (*Aedes aegypti*) can be destroyed.

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